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ABSTRACT

The vocational education teacher was the focus of this study designed to gain a better understanding of how communication relates to teaching effectiveness in a vocational setting. Teaching effectiveness was defined in terms of four criteria: supervisor evaluations of teachers, student evaluations of teachers, absentee rate, and drop rate. The teachers who served as subjects for the study came from a number of industrial education programs located in Florida secondary schools, vocational-technical centers, and community colleges. Two trained observers spent two days with each teacher recording his behavior and the behavior of his students. Underscoring the importance of communication skills, this study showed that there were identifiable differences in behavior among teachers categorized according to supervisor and/or student ratings. The "best" teachers were very dynamic, had superior delivery skills, spent a great amount of time in direct contact with their students, and created a pleasant social-emotional environment through the use of positive reinforcement and banter. Seven recommendations were made for vocational education on the basis of the findings in this study. (Author/RB)

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Communication and Teaching Effectiveness -- A Quantitative Study of Verbal and Nonverbal Communication in Vocational Education Programs in the State of Florida

The University of West Florida
Pensacola, Florida

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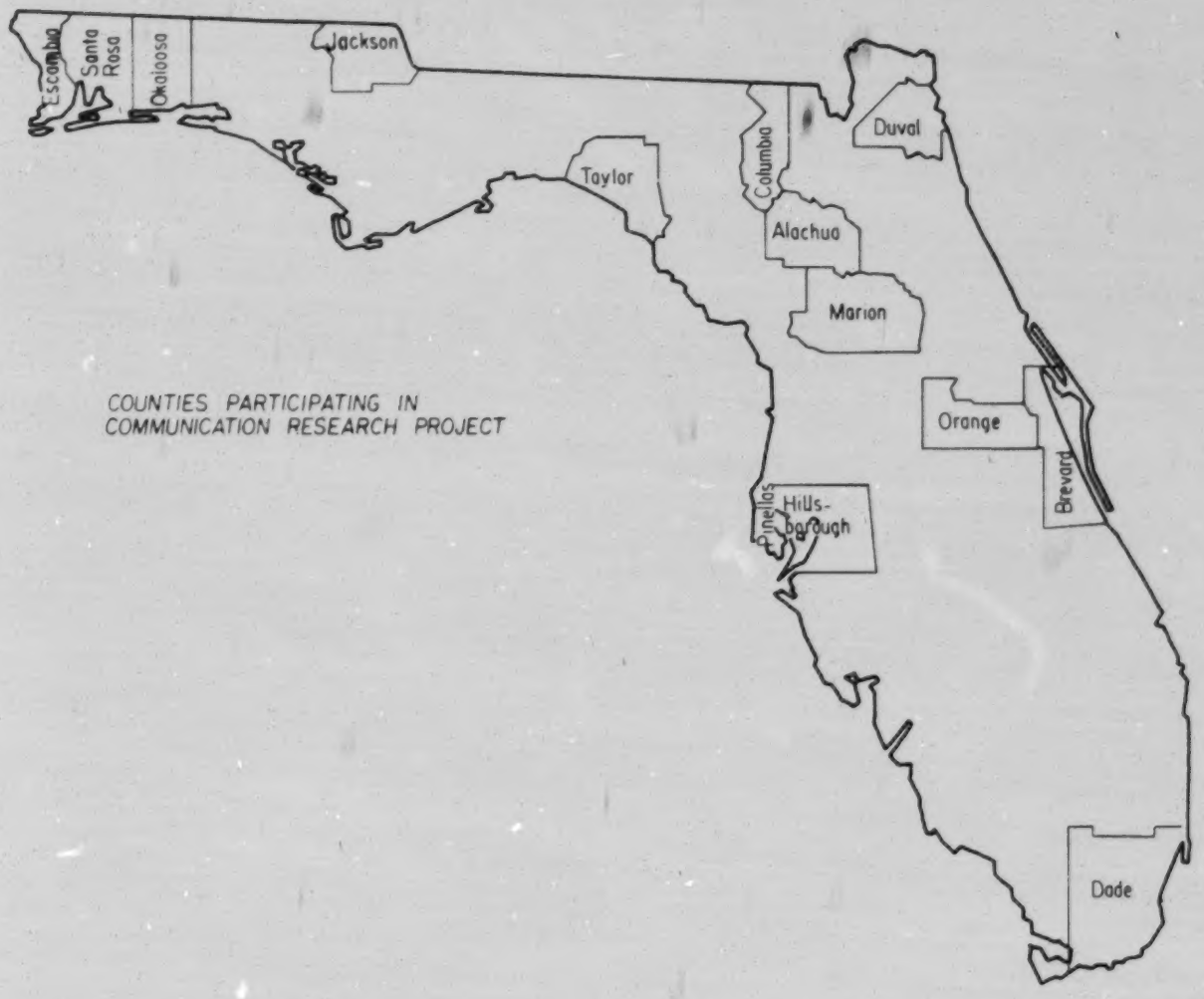

COUNTIES PARTICIPATING IN
COMMUNICATION RESEARCH PROJECT

ABSTRACT

The purpose of this study was to gain a better understanding of how communication relates to teaching effectiveness in the setting of vocational education. Teaching effectiveness was defined in terms of four criteria: 1) supervisor evaluations of teachers, 2) student evaluations of teachers, 3) absentee rate, and 4) drop rate. The focus of the study was the vocational education teacher, whose behavior and attitude determine to a great extent the quality and quantity of learning that takes place in the classroom. Since few studies had analyzed communication in the vocational setting (especially the shop situation) and even fewer had attempted to relate classroom communication to teaching effectiveness, this effort proceeded in a manner which might be described as macroscopic.

Direct observation was used as the means of collecting data, and a number of instruments were developed to tap various aspects of verbal and nonverbal communication. One of the instruments took into consideration the frequency and duration of contacts between the teacher and his students, the amount and kind of praise and criticism that the teacher gave, the amount of time spent in interruptions, and the number of times the teacher engaged in banter with his students. Another instrument was designed to assess the teacher's organization and presentation skills, and the degree to which he displayed enthusiasm and self-confidence as he conducted his class. Additional measures of behavior, e.g., the manner in which students were addressed, the heterogenity of shop activities, etc., were included, along with a measure of the teacher's attitude toward various aspects of teaching, to give as complete a picture of the communication environment as was possible. Finally, these measures were supplemented by information about the teacher's background, his program and students, and by a narrative account of the day's activities. The purpose of the narrative was to give a description of the overall style of the teacher and the perceived relationship between him and his students.

The teachers who served as subjects for the study came from a number of Industrial Education programs whose shop and classroom activities were conducted in a relatively similar manner. The majority of the teachers taught in mechanics-type programs such as Auto Mechanics and Air Conditioning and Heating Mechanics. Most of the remaining teachers came from Machinist and Welding programs. The teachers were located in three types of schools: secondary schools; vocational-technical centers, and community colleges.

Two trained observers spent two days with each teacher recording his behavior and the behavior of his students. The primary measures used

in the analyses were the averages of the two days' data. The observers collected data in 14 counties throughout the state. While most of the counties were located in the northern portion, an equal number of teachers were selected from the northern half of the state (using Orange County as the dividing line) and the southern half. It took approximately eight months to collect the data.

Once the data were collected, several factor analyses were made and, on the basis of the results, the data were combined into various indices of communication and attitude. Two kinds of analyses were then performed: 1) one-way analyses of variance in which teachers were separated into high, moderate, and low groups (using the scores on each teaching effectiveness criterion as the basis for grouping) and a determination was made of the communication skills and dimensions of teacher attitude that discriminated among the three groups of teachers; and 2) multiple regression analyses which consisted of selecting from the various measures of communication, attitude and information about the teacher, his program, and his students, the best predictors of each teaching effectiveness criterion. In addition to these, teachers were separated according to the size of their classes and the race of the teachers and their students, and the effects of each of these variables upon certain aspects of communication were analyzed.

The results of the analyses underscored the importance of communication skills in the teaching/learning process. The most critical measures of communication, or at least the most critical of the ones selected for study, had to do with how dynamic the teacher was (i.e., how well he could move about the shop in a manner that conveyed self-confidence, organizational ability, and enthusiasm); how well he could present his material (his deiivery); how much time he spent with his students; and how often he praised their work and bantered with them.

Although four criteria were selected as indicators of teaching effectiveness, only two of them, supervisor and student ratings of teachers, were useful in determining the relationship between teaching effectiveness and communication. The other two criteria, drop rate and absentee rate, were primarily related to the age of the teacher and the age of his students. They had little to do with his communication behavior.

This study showed that there were identifiable differences in behavior among teachers categorized according to supervisor and/or student ratings. The "best" teachers were very dynamic, had superior delivery skills, spent a great amount of time in direct contact with their students, and created a pleasant social-emotional environment through the use of positive reinforcement and banter. These characteristics and a positive attitude toward students were important determinants of favorable supervisor or student evaluations. Only Dynamism, however, was an important determinant of both.

On the basis of these findings, a number of recommendations were made.

1) Since the usefulness of this research depends ultimately upon the changes that a teacher makes in his behavior in order to become a better teacher, it was recommended that a population of Industrial Education teachers similar to the teachers who received low ratings (from supervisors or students) in this study be identified and invited to participate in an experimental teacher-training program in communication. A systematic study of changes in the teachers' behavior and consequent changes in their supervisor and student ratings would determine, in part, the validity of the findings of this study and their usefulness as a guide in training teachers to become more effective communicators.

2) The suggestion was made that the findings of this report be disseminated to all Industrial Education teachers. However, due to the technical nature of this monograph, it was recommended that an additional report, written in layman's terminology, be prepared.

3) In order to maximize the utilization of the data, a recommendation was made that additional data (e.g., a measure of self-esteem) be collected from the sample of teachers and analyzed in relation to the data that already exist.

4) The development of additional "teaching effectiveness" criteria for the evaluation of vocational education programs was also recommended. Such criteria might include not only skills-related measures but also measures of change in values, interests, and attitudes, the necessary concomitants of the acquisition of a skill. Improved criteria of teaching effectiveness are essential for the improvement of instruction.

5) Because of the uniqueness of the shop and classroom activities in the programs studied, the findings could not be generalized beyond the area of Industrial Education. Therefore, it was recommended that a replication of this study be made for other areas of vocational education, e.g., Business Education, Home Economics, etc. Results from studies in these areas would facilitate a more unified approach to the development of pre-service and in-service teacher-training programs in communication.

6) Currently, there is no course in communication designed specifically for the vocational education teacher. Therefore, the suggestion was made that such a course could be constituted, at least for Industrial Education teachers, from the data collected. Once studies have been conducted in other areas of vocational education, similar courses could be developed. Ultimately, consideration should be given to incorporating such courses into the certification requirements of vocational educators.

7) The value of a vocational program is related in many ways to factors beyond the teacher's control. Some of these factors involve communication. For instance, students communicate during the day not only with teachers but also with other students, counselors, and administrators. Their relationships to these groups may determine to some extent their attitudes toward the program and the degree to which they are motivated to

acquire a skill. Thus, a recommendation was made that studies be conducted at other levels of communication besides the classroom. Such studies might focus upon administrators and various aspects of organizational communication, or upon students and their interactions with counselors, administrators, and other students. In sum, it was recognized that the most fruitful approach to understanding communication in vocational education is to consider the total communication environment.

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TABLE OF CONTENTS

	Page
INTRODUCTION	1
Problem	1
Prior Research	2
Summary	6
FOOTNOTES	8
PROCEDURE	10
Design of the Study	10
Subjects	11
Instruments	13
Observers	21
FOOTNOTES	32
RESULTS	34
Description of Subjects	34
Reliability of Measures	41
Construction of Indices	43
Shop Communication Skills	43
Responses to the Teacher Q-Sort Instrument	48
Analyses of Communication and Attitude	53
Supervisor Evaluation Scores	59
Student Evaluation Scores	72
Combined Supervisor and Student Ratings	82
Absentee Rate	96
Drop Rate	96
Class Size	96
Racial Differences	105
Correlational Analyses	110
Predictors of Supervisor Evaluations	111
Predictors of Student Ratings	116
Predictors of Drop Rate	120
Predictors of Absenteeism	120
Miscellaneous Correlations among Independent Variables	120
Measures of Communication Skill	124
FOOTNOTES	131

Page

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS 133

Summary 133
Conclusions 137
Recommendations 138

FOOTNOTE 140

APPENDIX

A. Location of Each Program 141
B. Letter of Invitation to Participate in Study . . . 145
C. Notification of Acceptance to Participate in Study . 148
D. Teacher Assessment Inquiry Form 150
E. Coding Form for Teacher-Student Interaction . . . 152
F. Examples of Positive and Negative Reinforcement . . 154
G. Shop Rating Scales 158
H. Classroom Rating Scales 162
I. Teacher Program Information Form 166
J. Q-Sort Statements (Teacher Attitude) 168
K. Student Evaluation Form 171
L. Q-Analysis of Teacher Attitude Responses 174
M. Positive and Negative Narratives 185

BIBLIOGRAPHY 190

INTRODUCTION

Problem

In the next few years increasing demands will be placed upon vocational educators to implement and sustain programs for the burgeoning population of career-oriented individuals. The U. S. Office of Education estimates that by the mid-1970's 345,000 teachers will be needed in vocational fields alone.[1] Such demands make salient in Florida and elsewhere the critical problem of teacher selection and preparation. Schaefer points out that:

> There is need for . . . individuals with subject matter expertise and intellectual ability, but also with personal attributes which intensify learning--individuals with, in Stone's words, 'the ability to listen, who emphasize inquiry, social sensitivity and self-direction, and who are around and about the classroom, guiding, probing, and encouraging.'[2]

In essence, what Schaefer and Stone suggest is that teachers need to be aware of and develop the necessary communication skills to facilitate the learning process.

Research on human communication indicates that many factors are potentially responsible for differences among teachers in their ability to communicate effectively. In certain situations, these differences might be great enough to affect the amount and kind of learning that takes place. Some studies show, for example, that a student's perception of the teacher's personal credibility may be affected by the teacher's presentation skills. One aspect of presentation skills, speaker nonfluency, has been shown to decrease the listener's ratings of the credibility of the speaker.[3] Other presentation factors--including rate of speaking, loudness, and vocal inflection--also seem to have an impact upon the listener's perception of the speaker's credibility.

Presentation skills constitute only one of the potential problems in communication. Numerous other factors, some nonverbal, must be considered as potential barriers to effective communication. Hall, for instance, tells the story about his appointment to a committee on human relations, the purpose of which was to ascertain the chances for adopting non-discriminatory practices by various city officials. Although each official's verbal statement indicated a positive attitude toward the idea, Hall detected that a better perception of their position could be gained from observing their use of time and space--what he termed the

"silent language." Delayed or forgotten appointments, hurried interviews, and the distance and barriers maintained by the officials communicated much to Hall about their true feelings.[4]

A similar situation exists in the teaching/learning process where the symbiotic relationship between the development of attitudes, interests, and values (the affective realm) and the acquisition of knowledge is often fostered by the teacher's nonverbal activities. Consider, for example, the vocational teacher who is habitually late or who neglects safety standards in the shop. Such nonverbal behaviors are soon likely to be transformed and integrated into the student's value system. Moreover, when the teacher attempts to impress upon the student the importance of safety and punctuality in the world of work, his personal credibility--an important communication variable--is likely to be questioned and his message ignored.

While a number of research findings suggest the possible kinds of behaviors that are likely to facilitate or impede communication in the classroom, there are few substantive studies which identify specifically what those behaviors are. For the aspiring or practicing vocational education teacher, whose teaching environment is often different from the traditional classroom arrangement, the picture is even less enlightening. To our knowledge, no one has conducted a macroscopic analysis of teaching behavior in the vocational education setting. The few studies that have attempted to identify "patterns" of teaching behavior have often failed to link those patterns to established criteria for teaching effectiveness. The purpose of this study, therefore, is to analyze communication in the vocational education setting and to identify those behaviors that relate to various criteria of effective teaching. Hopefully, the results from this study can be used as a guideline in the development of pre-service and in-service teacher training programs in communication, for as Schaefer notes: "Ability to convey subject matter, combined with insight into human behavior, constitutes a powerful teaching tool for any educator."[5]

Prior Research

For many years scholars have attempted to analyze classroom communication. Much of this research has used the method of direct observation to collect data. Categorizing the behavior of the teacher and students, researchers have been able to identify different patterns of communication. Most of these studies have been synthesized elsewhere;[6] therefore, we will concentrate on reviewing some of the more recent studies that have been conducted.

The Flanders system of interaction analysis has been one of the most widely used methods for determining classroom communication patterns.[7] Flanders, building upon earlier research, developed a category system for classifying the teacher's verbal behavior. Each behavior is coded by an observer at three-second intervals and later transformed into a matrix which allows the researcher to determine the overall pattern of teacher-

student interaction. The major thrust of studies utilizing the Flanders instrument has been to assess whether the teacher uses a direct or an indirect approach, the latter supposedly being the most effective style and characterized by the teacher's acceptance of the student's feelings and ideas and his use of praise and inquiry. The direct approach is characterized by a lack of student participation and the teacher's use of criticism.

Flanders recently reviewed the research utilizing the interaction analysis instrument and found that the relationship between patterns of communication and learning outcomes (student achievement and attitude) may be nonlinear.[8] This was especially true when the achievement criteria consisted of tasks requiring less abstract reasoning. For the lower level cognitive tasks, an optimum point was found for teacher indirectness. In other words, for these kinds of tasks, students were able to tolerate higher levels of criticism and non-participation.

When sustained acceptance of students' feelings and ideas was correlated with attitude toward the teacher, a similar curvilinear relationship was found.[9] While sustained acceptance was generally associated with favorable attitudes, an excessive use of this resulted in less favorable attitude scores.

Despite these results, Flanders believes that the majority of studies support the notion that: "The percent of teacher statements that make use of ideas and opinions previously expressed by pupils is directly related to average class scores on attitude scales of teacher attractiveness, liking the class, etc., as well as to average achievement scores adjusted for initial ability."[10]

Bellack et al. used a somewhat different classification system in their analysis of verbal discourse in fifteen social studies classes.[11] Statements were categorized according to the pedagogical function they served, e.g., structuring, soliciting, responding, or reacting. Each category was twice further subdivided into more specific units of meaning. The analysis was based on recordings (and transcriptions) made of a standardized unit of instruction in each class. Besides a description of the general pattern of communication, the researchers attempted to relate linguistic variables to learning outcomes. While attitude change toward the subject matter showed little variation from one class to another, an analysis of adjusted scores of knowledge gained revealed significant differences (at the .10 level of confidence) among several of the classes. Separating them into high and low gain groups, however, failed to reveal any clear-cut differences in linguistic patterns. It should be noted that for the analyses of the high and low gain groups the researchers did not test for significance on any of the communication variables presented; therefore, their speculations about differences that did exist are tenuous.[12]

In recent years researchers interested in classroom communication have begun to consider the nonverbal as well as the verbal aspects of communication. Galloway states that:

> The teacher plays various roles in an instructional setting, and prevading [sic] all the roles the teacher enacts is the process of verbal and nonverbal communication. The teacher is both a sender and receiver of messages. In the nonverbal dimension of communication, the teacher conveys messages in many diverse ways. According to many writers in educational literature, both the teacher and the pupil tend to transmit their attitudes and feelings through nonverbal channels. Indeed, many writers and researchers . . . make the assumption that nonverbal cues are at least as significant as verbal remarks when a pupil attempts to ascertain the feelings, intentions and attitudes of the teacher. Thus, if the assumption is sound, nonverbal expressions are paramount considerations for understanding the communicative process in the classroom; and such expressions have significant implications for teacher-pupil relationships.[13]

Galloway developed a category system for coding the teacher's nonverbal behavior (most of which could be classified as paralinguistic behavior).[14] He observed that most teacher behavior could be conceived of as encouraging or inhibiting communication. Data were collected from six elementary classrooms. In addition to data derived from the category system, Galloway utilized data taken from descriptive narrations of the teacher's communication. These narrations were rated by three judges according to the percentage of encouraging, neutral, or inhibiting behaviors. Also, three experts from the fields of communication, curriculum, and leadership observed the teachers and made a global assessment of nonverbal communication. Results showed little relationship among the three measures, although correlations between the two observers using the classification system and correlations among the three judges rating transcriptions were significant.

Students' perception of the teacher's attitude were also obtained and correlated with the various measures of nonverbal communication. The only significant relationship found was for the curriculum expert whose rankings of teachers from most encouraging to least encouraging correlated .94 with students' rankings of teacher attitude.[15]

More recently, Galloway's category system for nonverbal communication has been combined with the interaction analysis instrument developed by Flanders.[16] Besides assessing the direct versus indirect teaching approach, researchers can now determine whether the method is encouraging or restrictive.

Loepp also combined categories of verbal and nonverbal communication in his study of ten junior high school industrial arts teachers.[17] Two classifications of nonverbal communication were used: 1) nonverbal direct, consisting of those instances when the teacher's nonverbal behavior transmitted information or direction to one or more students; and 2) nonverbal

indirect, consisting of those nonverbal activities which indirectly influenced the class, e.g., the teacher moving about the classroom. The verbal classifications were similar to those of the Flanders instrument except for one category. The category "lecturing" was changed to "information giving" since formal lectures rarely occurred in industrial arts classrooms.

Loepp concluded from his analysis that the instrument he used was a reliable and valid category system for providing data concerning teacher-student interaction. While he stated that the instrument could be used to identify effective teaching patterns, he offered no evidence as to the composition of those patterns or what criteria would be used to judge them as effective and ineffective.

The instrument developed by Loepp was used by Kruger in a similar study of industrial arts teachers at the junior high school level.[18] Twenty teachers participated in the study, and based on the findings, Kruger recommended that:

> Existing and future industrial arts teachers should have an excellent command of 'communicative tools.' Since much of the teacher's time is spent in giving directions and information to students, this information should be clear, concise, and easily understood by the students so as to allow the teacher to make as many contacts with students during a period as possible.[19]

This study, like that of Loepp, provided only descriptive data. No attempt was made to establish any criteria for teaching effectiveness and to relate these to the interaction patterns. Although the small sample size prevented certain correlational techniques, e.g., regression analysis, selecting teachers according to some theoretical notions about communication might have enabled a more sophisticated treatment of the data. Instead, Kruger noted that an attempt was made to "include a wide range of factors (e.g., socio-economic) which might affect classroom climate."[20] This approach, combined with the small sample size, restricted the kinds of analyses that might have shed light on the relationship between communication and other possible factors affecting the teaching/learning environment.

Like Galloway and Loepp, Grant and Hennings also incorporated aspects of nonverbal communication into their measuring instrument.[21] Building upon the work of Bellack et al., these researchers described the nonverbal behavior of five elementary school teachers whose classroom sessions were videotaped and later analyzed. Nonverbal behavior was characterized as either instructional (conducting, acting, and wielding) or personal (mannerisms that serve no instructional purpose). Clarifying these behavior categories, Grant and Hennings state:

> At the physical level, he [the teacher] is performing as a conductor, using gestures and motions that often bear a striking resemblance to the gestures and motions of a musical conductor. The teacher is also performing as an actor, building interest and clarifying meanings with his body. In addition, he is performing as a technician, wielding aspects of the environment. Finally, the teacher is performing as a human being, bringing with him into the classroom personal motions that do not have an instructional purpose.[22]

The results of their study revealed that teachers used instructional motions four times as often as personal ones. The majority of the instructional nonverbal behavior was classified as conducting (62%), followed by wielding behaviors (29%), and then acting (9%). With such a small sample size, however, it was impossible to relate nonverbal communication to teaching effectiveness. Thus, while differences in teaching styles (patterns of verbal and nonverbal behavior) were found, the researchers could only speculate on the importance of those differences.[23]

Summary

In reviewing the research on classroom communication, several points are worth noting. First of all, in many of the studies too few teachers have been analyzed to determine whether significant relationships exist between particular behavior patterns and criteria which might be considered representative of effective teaching. As a result, except in a general sense, it is difficult to specify which communication behaviors will lead to the desired learning outcome.

Secondly, most of the studies involved teachers in elementary and secondary schools in traditional classroom settings. In many vocational education programs, an entirely different classroom structure exists. Furthermore, the types of activities that take place are often different, and therefore communication patterns are likely to vary. For example, as Loepp discovered, formal lecturing may be the exception rather than the rule. In a shop situation where students often work independently on their projects, the teacher's ability to interact with each student individually may be one of the most important communication variables to consider, for this aspect of communication tells us something about the teacher's use of time. Noting the importance of this variable, Galloway reports that:

> How teachers use their time indicates the value and importance they place on something. . . . Teachers do not ordinarily recognize the meaning of their use of time, but students can frequently relate what a teacher's preferences are and what the teacher dislikes.[24]

Besides the frequency and perhaps duration of contacts he makes, the teacher may also reveal information about himself by whom he chooses to contact. Consider the teacher who is constantly helping one group of students while neglecting another group. Such a situation could exist when students of different races or different socio-economic levels are enrolled in the same class. It seems reasonable to assume, for example, that white teachers may feel more comfortable interacting with white students, while black teachers may be more apt to spend a greater proportion of their time with black students. Although any discriminatory behavior may be performed unconsciously by the teacher, chances are the neglected students will be aware of this behavior and will form a different opinion about the teacher from the group that is favored. In some instances, this difference could act as a barrier to effective communication.

To summarize, research on teaching behavior suggests that consideration must be given to nonverbal as well as verbal aspects of communication. However, to our knowledge, few studies have included a sufficient number of teachers to make a meaningful analysis of the relationship between communication and teaching effectiveness. Also, as far as we know, no studies exist that take into consideration the unique teaching environment found in many vocational education programs.

On the basis of these findings, it seems necessary, if vocational education teachers are to understand and develop effective communication skills, that a study of teaching behavior in the vocational setting be implemented. In discussing the design and instruments for such a study, it should become apparent that in many respects this research is without precedents, and is therefore largely exploratory. Given this limitation, it seemed best to us to proceed in a manner which might be characterized as macroscopic.

FOOTNOTES

[1]Carl J. Schaefer, "Teaching the Teachers: New Dimensions for Instructional Roles," in The Courage to Change: New Directions for Career Education, ed. by Roman C. Pucinski and Sharlene Pearlman Hirsch (Englewood Cliffs, N. J.: Prentice-Hall, 1971), p. 135.

[2]Ibid., p. 136.

[3]Gerald R. Miller and Murray A. Hewgill, "The Effects of Variations in Nonfluency on Audience Ratings of Source Credibility," Quarterly Journal of Speech, L (February, 1964), 36-44.

[4]Edward T. Hall, The Silent Language (Garden City, N. Y.: Doubleday and Company, 1959), pp. 23-24.

[5]Schaefer, p. 135.

[6]See, for example, Donald M. Medley and Harold E. Mitzel, "Measuring Classroom Behavior by Systematic Observation," in Handbook of Research on Teaching, ed. by N. L. Gage (Chicago: Rand McNally and Company, 1963), pp. 247-328; Edmund J. Amidon and John B. Hough, eds., Interaction Analysis: Theory, Research, and Application (Reading, Mass.: Addison-Wesley Publishing Company, 1967); Karl E. Weich, "Systematic Observational Methods," in The Handbook of Social Psychology, ed. by Gardner Lindsey and Elliot Aronson (2nd ed.; Reading, Mass.: Addison-Wesley Publishing Co., 1969), II, 357-451.

[7]The most recent account of the Flanders instrument is found in Ned A. Flanders, Analyzing Teaching Behavior (Reading, Mass.: Addison-Wesley Publishing Company, 1970).

[8]Ibid., pp. 403-409.

[9]Ibid., pp. 405-406.

[10]Ibid., p. 424.

[11]Arno A. Bellack, Herbert M. Kliebard, Ronald T. Hyman, and Frank L. Smith, Jr., The Language of the Classroom (New York: Teachers College Press, 1966).

[12]Ibid., pp. 221-235.

[13]Charles M. Galloway, "An Exploratory Study of Observational Procedures for Determining Teacher Nonverbal Communication" (unpublished doctoral dissertation, University of Florida, 1962), p. 5.

[14]Galloway, pp. 146-149.

[15]Ibid., p. 114.

[16]Charles M. Galloway, "Nonverbal Communication," Theory Into Practice, VII (December, 1968), 172-175.

[17]Franzie Lee Loepp, "The Development of a System to Analyze Teacher-Student Interaction in Junior High School Industrial Arts Classrooms" (unpublished doctoral dissertation, University of Northern Colorado, 1971).

[18]John M. Kruger, "Interaction Patterns of Industrial Arts Teachers in Laboratory Type Situations at the Junior High School Level" (unpublished doctoral dissertation, University of Colorado, 1971).

[19]Ibid., p. 126.

[20]Ibid.

[21]Barbara M. Grant and Dorothy Grant Hennings, The Teacher Moves (New York: Teachers College Press, 1971).

[22]Ibid., p. 17.

[23]Ibid., pp. 42-60.

[24]Galloway, "Nonverbal Communication," p. 173.

PROCEDURE

Design of the study

Various methods of gathering communication data in the vocational setting were considered. The most economical (but perhaps least reliable) method consists of asking teachers for a self-report of their perceived communication behavior. In terms of time, money, and execution, this would be the most convenient way to gather data. In terms of the usefulness of the results, however, the disadvantages seemed to far outweigh the merits.

Prior research has shown the usefulness of measuring teaching behavior by systematic observation. Despite its obtrusive nature, direct observation has many advantages. Medley and Mitzel note that:

> If an investigator visits a group of classrooms, he can be sure that, regardless of his presence, he will see teachers teaching and pupils learning; he will see better and poorer teachers; effective and ineffective methods, skillful and unskillful use of theory. If he does not see these things, and measure them, it will not be because these things are not there to see, record, and measure. It will be because he does not know what to look for, how to record it, or how to score the records; in short, he does not know how to measure behavior by systematic observation.[1]

The method of direct observation was incorporated into the design of the present study.

With the availability of sophisticated technology, there are some alternatives for direct observation. For example, lightweight videotape equipment can be used to record teacher and student activities. These recordings can then be played back at a later time and analyzed for their communication content. One advantage of this method is that an actual and permanent record is made of the classroom activities, thereby enabling the observer or anyone else to recheck the coding for any problems that might arise.

Another procedure, especially applicable to the vocational shop arrangement, is to have the teacher wear a microphone with radio transmitting components. (This eliminates the use of a cord.) A small, portable FM radio can then be stationed in a location convenient to the observer and tuned to the microphone-transmitter's frequency. From

one location, the teacher's verbal behavior can then be monitored and recorded.

Both the videotaping and microphone-transmitting methods were tried, but neither yielded satisfactory results. The novelty of the television camera constantly following the teacher about the shop was simply too distracting. Also, taping and analyzing the sessions afterwards doubles the amount of time that has to be spent with each teacher. These factors, coupled with the cost of equipment and tapes, negated the use of the video recorder as a method of observation.

The use of a microphone-transmitter was also unsatisfactory. The existence of metal materials in the shop sessions and the distance from the teacher to the radio receiver often affected the quality of the radio signals, rendering them at times inaudible. Although an attempt was made to create a more powerful antenna, the quality of the signal produced remained inconsistent.

Another disadvantage of the microphone-transmitter method was its inability to record nonverbal communication. Since the observer stayed in one position, he could not always see the teacher who may have turned away or have moved outside the immediate shop area. Then, too, the microphone, like the television camera, readily reminds the teacher and students that their activities are being monitored.

The method that proved most satisfactory in a shop situation was for the observer to follow the teacher as he traveled about. Practice showed that the observer could stay several feet away from the teacher and still record his behavior. At the same time, the observer could assess the behavior of the student as he interacted with the teacher and could note the duration of the interaction. In a classroom situation, the observer could position himself in a strategic location where he could remain for the entire session. This procedure was similar to the one used in many behavioral studies of elementary and secondary school teachers.

Subjects

One of the prerequisites for selecting teachers was that the sample had to be drawn from vocational programs in which the activities were relatively similar. The reason for this was that measuring instruments that take into consideration the teacher's use of time and space may not be reliable if the kinds of classroom sessions vary greatly. For example, it seems highly probable that a teacher confined to a traditional type classroom as found in many office education programs would use time and space differently from the teacher whose instruction takes place in an auto repair shop. The relatively more spacious shop area may require more time for the teacher to contact each student and more effort to maintain organization since the traditional arrangement probably enables better surveillance.

While these assumptions about variations in activities were not formally tested, they were based on observations made in various vocational classes. Following these observations it was decided that we should either analyze teachers separately according to their teaching environment or concentrate on one particular teaching environment, e.g., the shop arrangement. The latter alternative was chosen because it allowed us to have twice the sample size for the same type of teacher activities, thus enabling more reliable analyses. (Budgetary considerations were such that our anticipated total sample size would be approximately 120 teachers.) Also, we chose to study teachers who taught in the shop-type programs since few communication guidelines existed for teachers in this kind of teaching environment.

Despite the fact that the shop is the place where most teaching activities take place, in these type programs teachers often utilize in the course of the day the more formal classroom situation as well. Therefore, in many instances we would be able to compare the teacher's communication skills in both kinds of teaching environments.

Many of the shop-type programs fall under the heading of Industrial Education, the third largest vocational program section according to student enrollment in vocational-technical programs in Florida in 1970.[2] We therefore selected teachers from Industrial Education programs whose physical facilities engendered somewhat similar teacher and student activities. The programs included:

Air Conditioning and Heating Mechanics
Auto Body Repair
Auto Mechanics
Aviation Mechanics
Diesel Mechanics
Diversified Mechanics
Gasoline Engine Mechanics
Machine Shop Work
Marine Engine Mechanics
Welding
Millwork Shop
Agricultural Mechanics
Sheet Metal
Plumbing

Teachers in Industrial Education are found in secondary, post secondary, adult, and exemplary programs. After having visited each of these, we decided to omit from our study teachers in the exemplary programs. Because of the uniqueness of these programs, we believed that our criteria for teaching effectiveness would not be satisfactorily comparable between teachers in the exemplary programs and the others.[3]

The various programs that we did select are found in vocational and secondary schools and community colleges. The Florida Industrial Education directory of teachers and administrators served as a handy

guide for choosing counties that had secondary schools, vocational centers, and community colleges with a sufficient number of teachers (Appendix A) in the appropriate programs.[4] A letter explaining the nature and purpose of the study was sent from the state director of vocational education to various county school superintendents and community college presidents (Appendix B) inviting them to participate in the project. Following notification of a desire to participate in the study (Appendix C), we contacted the designated vocational administrators and supplied them with sufficient copies of the Teacher Assessment Inquiry Form (Appendix D). We requested that a form be completed for each teacher in the programs we had listed. The completed forms were then returned directly to us. They were not seen by the individuals who observed and recorded the behavior of the teachers.

Once the teacher evaluation forms were returned and scored, they were divided into three groups: high, [illegible] From each of these groups, a random sample of teachers was [illegible] The purpose of stratifying the sample was to enable us to [illegible] order the teacher evaluation scores and to compare the [illegible] ation skills of teachers whose scores fell in the upper quartile with those whose scores were in the middle 50 per cent or lower quartile of the sample. Initially, we had hoped to have all forms returned before we began selecting our sample. However, this was not the case. By the time our observers were ready to begin collecting data, we had received teacher evaluations from only a few administrators. Thus, the sampling process continued along with the study. As a result of this procedure, because we purposely wanted three fairly evenly divided groups of teachers, it became necessary as more evaluations were returned to choose relatively fewer of the highly rated teachers and more of the lowly rated ones to maintain proportionality. This was due to the fact that the teacher evaluation forms were almost always scored positively. While sampling from each school was therefore not entirely representative of the supervisor's perception of the quality of his teachers, this posed no particular problem since it was not our intention to compare teachers from one area with those from another area. Instead, we wanted teachers who reflected a wide range of perceived teaching abilities. In addition, we wanted these teachers to be fairly evenly distributed throughout the state and to come from several different kinds of vocational schools with different kinds of students. The sample of teachers ultimately chosen fulfilled these criteria.

Instruments

While traditional interaction analysis instruments (e.g., the ones developed by Flanders, Galloway, etc.) could be used to record teaching behavior in the classroom situation, it became readily apparent that the observational method devised for the shop sessions precluded the use of these techniques. One of the reasons for this was the difficulty in recording data at such short time intervals. (Flanders, for example, recommends a three-second interval.[5]) More importantly, though, it was

questionable whether the category systems of the interaction analyses instruments reflected the kinds of activities that would best lead to our understanding of what constitutes effective communication in the shop situation.

Earlier, the suggestion was made that in analyzing the shop session, one important communication variable might be the frequency of contacts the teachers makes with each individual student. In order to record this, an instrument was developed that allowed for coding each behavior according to its recipient, or in the case of a student initiating contact with the teacher, its initiator (Appendix E). Also, the duration of each contact lasting more than a half minute was recorded along with the instance of interaction.[6] On some occasions the teacher contacted the entire class or small groups instead of individuals. A category was allowed for each of these type contacts. In addition, for each small group contact, a check was made of the individuals comprising the group.

Since the use of praise and criticism by the teacher often serves as an index to the social-emotional environment in the classroom (i.e., the degree to which the student perceives the psychological atmosphere as non-threatening) as well as indicating the teacher's style of teaching, the inclusion of these communication variables seemed especially important.[7] Therefore, in addition to the number of contacts the teacher made, each instance of teacher praise or positive reinforcement and teacher criticism or negative reinforcement was also recorded. The purpose again was to identify not only the frequency of such behavior but also its recipient. Whenever the contact between the teacher and student consisted only of positive or negative reinforcement, it was coded twice--once as a contact and once as positive or negative reinforcement. This enabled an accurate recording of the total number of teacher-initiated contacts.

In order to clarify the nature of positive and negative reinforcement, observers were required to record as accurately as possible exactly what the teacher said and to code it (as positive or negative reinforcement) in terms of its perceived impact upon the student (Appendix F). Nonverbal reinforcement behavior was also recorded since the teacher's facial expression alone often conveyed to the student an assessment of his (the student's) work. Despite the limitations of these classifications--we do not really know, for example, how each instance of praise or criticism is perceived by the student since such behavior probably interacts with a myriad of other factors in the teacher-student relationship--they do allow us to describe the nature and frequency of praise and criticism as used in the vocational shop. Hopefully, we will be able to relate these behaviors to other aspects of teaching in order to gain a better understanding of communication in the teaching/learning process.

Another index of the social-emotional climate is the teacher's use of banter. In one of the earliest comprehensive studies of teacher effectiveness, Barr found that good teachers (as determined by supervisor ratings) performed more acts of laughing and smiling with the class than did poor

teachers.[8] Thus, a recording of both the number of instances of positive and negative reinforcement and banter provides some indication of the learning atmosphere created by the teacher.

After observing many shop sessions, it was found that another variable, the frequency and duration of interruptions, was also likely to affect the quality of teaching. On many occasions the teacher was engaged in nonteaching activities. Sometimes these activities were directly related to his work, e.g., checking and ordering supplies, conversing with administrators, counselors, and other teachers, etc. At other times the activities appeared not to be related. Included in this category would be personal phone calls, independent work on the teacher's own project, or non-scheduled work breaks. Instances and durations of interruptions were therefore recorded by the observer. An account was made also of the nature of the interruptions.

The behaviors mentioned so far formed the basis for constructing the various indices for analyzing communication in the shop situation. While these behaviors and indices are by no means exhaustive, they reflect the macroscopic approach of the study and hopefully encompass the critical communication variables. As Figure 1 shows, each behavior was weighted according to the length of the shop session. For some indices, an additional weighting was made for the number of students in the class.

As an additional measure of the teacher's communication effectiveness in the shop, a rating scale was developed (Appendix G). Based on the guidelines suggested by Becker,[9] Remmers,[10] and Kerlinger,[11] this instrument focused mainly upon organization and presentation skills. Also included was a rating of the kind of respect terms most frequently employed by the teacher.

To give an even more complete picture of communication in the shop, the observer also noted the teacher's use of space and the specific activities for which he (the teacher) showed enthusiasm and gave praise (Appendix G). Those activities for which the teacher did not show enthusiasm or which prompted criticism were also recorded. Since it was reasoned that patterns of communication may vary according to the types of activities that take place, measures of the heterogenity of activities and the type of shop session were also included. Finally, a five-step rating scale provided a rough indication of the general noise level in the shop. A much more sophisticated means of gauging noise level was considered; however, the expense of the instrument and the amount of time that would have to be devoted to administering it precluded its use.

Following each shop session, the observer also provided a detailed narrative account of his perception of the activities that had taken place (Appendix G). The main purpose of this account was to gain some impression of the distinguishing characteristics of the communication environment. For example, some shop sessions were particularly notable for the cleanliness or arrangement of the shop. Others were characterized by the tone set by the teacher, or the discipline of the students, etc. The narratives,

	Index	Method of Calculation
Teacher-initiated contacts with students	Number of teacher-initiated contacts per hour	$\frac{\text{Total number of teacher-initiated contacts with students}}{\text{Total Shop time}} \times 60$
	Number of teacher-initiated contacts per student per hour	$\frac{\text{Total number of teacher-initiated contacts/number of students}}{\text{Total Shop time}} \times 60$
	Number of minutes per hour of teacher-initiated contacts with students	$\frac{\text{Total time of teacher-initiated contacts}}{\text{Total Shop time}} \times 60$
	Number of minutes per student per hour of teacher-initiated contacts with students	$\frac{\text{Total time of teacher-initiated contacts/number of students}}{\text{Total Shop time}} \times 60$
	Average length of time (minutes) of teacher-initiated contacts	$\frac{\text{Total time of teacher-initiated contacts}}{\text{Total number of teacher-initiated contacts}}$
	Percentage of students contacted during shop session	$\frac{\text{Total number of different students contacted during total shop time}}{\text{Total number of students}} \times 100$
Student-initiated contacts with teacher	Number of student-initiated contacts per hour	$\frac{\text{Total number of student-initiated contacts}}{\text{Total Shop time}} \times 60$
	Average number of student-initiated contacts per hour	$\frac{\text{Total number of student-initiated contacts/number of students}}{\text{Total Shop time}} \times 60$
	Number of minutes per hour of student-initiated contacts with teacher	$\frac{\text{Total time of student-initiated contacts}}{\text{Total Shop time}} \times 60$

Figure 1.--Communication indices for the Shop situation

	Index	Method of Calculation
Student-initiated contacts with teacher	Average number of minutes per hour that students spent in their initiated contacts with teacher	$\frac{\text{Total time of student-initiated contacts/number of students}}{\text{Total Shop time}} \times 60$
	Average length of time (minutes) of student-initiated contacts	$\frac{\text{Total time of student-initiated contacts}}{\text{Total number of student-initiated contacts}}$
Combined teacher and student contacts	Number of teacher + student-initiated contacts per hour	$\frac{\text{Total number of teacher + student-initiated contacts}}{\text{Total Shop time}} \times 60$
	Number of teacher + student-initiated contacts per student per hour	$\frac{\text{Total number of teacher + student-initiated contacts/number of students}}{\text{Total Shop time}} \times 60$
	Number of minutes per hour spent in teacher-initiated + student-initiated contacts	$\frac{\text{Total time of teacher + student-initiated contacts}}{\text{Total Shop time}} \times 60$
	Number of minutes per student per hour spent in teacher-initiated + student-initiated contacts	$\frac{\text{Total time of teacher + student-initiated contacts/number of students}}{\text{Total Shop time}} \times 60$
	Average length of time (minutes) of teacher-initiated + student-initiated contacts	$\frac{\text{Total time of teacher + student-initiated contacts}}{\text{Total number of teacher + student-initiated contacts}}$
	Number of instances of positive reinforcement per hour	$\frac{\text{Number of instances positive reinforcement}}{\text{Total Shop time}} \times 60$

	Index	Method of Calculation	
Positive and negative reinforcements	Number of instances of negative reinforcement per hour	$\frac{\text{Number of instances negative reinforcement}}{\text{Total Shop time}}$	X 60
	Total number of instances of reinforcement (positive and negative) per hour	$\frac{\text{Positive + negative reinforcement}}{\text{Total Shop time}}$	X 60
	Positive/Negative reinforcement ratio	$\frac{\text{Total instances positive reinforcement}}{\text{Total instances negative reinforcement}}$	
Banter	Number of instances of banter per hour	$\frac{\text{Total instances of banter}}{\text{Total Shop time}}$	X 60
Interruptions	Number of interruptions per hour	$\frac{\text{Total number of interruptions}}{\text{Total Shop time}}$	X 60
	Number of minutes per hour spent in interruptions	$\frac{\text{Total time of interruptions}}{\text{Total Shop time}}$	X 60
	Average length of time of interruptions	$\frac{\text{Total time of interruptions}}{\text{Total number of interruptions}}$	

therefore, served to fill in the communication gaps, i.e., to explain the perceived important aspects of communication that were not accounted for by the primary measuring instruments, and also to clarify more completely the measures that were obtained. This kind of information seemed especially important in an exploratory study.

In many vocational programs, the formal classroom setting is utilized much less frequently than the shop. Nevertheless, it is often an important adjunct to the shop, for it provides a convenient place for sessions involving lecturing, group discussion, or problem solving. Since, to a great extent, the value of these type sessions depends upon the behavior of the teacher, an instrument was developed to determine the teacher's communication skills in the classroom situation as well as in the shop. Because of the numerous other instruments with which the observer had to cope and also because of the ease in administration, a rating scale similar to the one employed for the shop situation was used to tap classroom communication skills (Appendix H). The items on these scales included certain delivery skills such as vocal rate, loudness, and fluency as well as other presentation and organization skills.

For the classroom session also, an account was made of the general communication environment and the kinds of activities which provoked enthusiastic and unenthusiastic responses and praise and criticism from the teacher. A corroboration of these classroom skills with shop skills seemed especially worthwhile since many teachers in shop-type programs are likely to have had most of their experience in industry, which is similar to the shop setting, and less experience in the classroom or more formal education setting. Under such circumstances, we might suspect that teachers in these programs are more skillful communicators in the shop than in the classroom.

Various other data were obtained which we believed might help to explain differences in teaching effectiveness. Among these were information about each teacher's education and experience, age, and ethnicity (Appendix I). We also had each teacher rank order twenty-nine attitudinal statements about school, the students, the status of teachers, etc. (Appendix J) These were analyzed with both Q-and R-type analyses. The former was to discover whether different "types" of teachers could be identified based on the structure of their attitudes and, if so, whether "type" was related to teaching effectiveness. The R-analysis was a normal factor analysis whose results could be used to obtain measures of each teacher's attitudes on each attitudinal dimension. (The set of statements and analyses are described in greater detail later in this report.)

Data from the preceding instruments constituted the measures of communication, teaching, and background which we believed could influence

or explain the effectiveness of vocational education teachers. In addition to these we used four measures of teaching effectiveness:

1. Supervisor ratings on the five-item scales described earlier.

2. Student ratings on a nine-item scale developed specifically for this study, but based in part on student rating scales used in other studies. (A copy of the scale can be seen in Appendix K.)

3. Absentee rate of students.

4. Drop rate of students. The rationale for this measure and the preceding measure is that the effectiveness of a teacher in a vocational program, we believe, is very closely tied to his ability to interest students sufficiently to attend class regularly and to stick with the course to its completion.

Noticably absent from the various criteria that might be considered indicative of teaching effectiveness, in addition to supervisor and student ratings of the teacher, etc., is any direct measure of student achievement, the most important dependent variable in the teaching-learning process. Although we found no means that was appropriate, much time and effort was spent considering ways in which this information might have been obtained. One method, for example, would have been to have used an experimental approach. We might have attempted to devise a standardized unit of instruction for the shop and classroom session, controlled for individual differences in prior knowledge and learning ability and, following the session, measured student achievement. Complicating such an approach, however, was the fact that data were obtained from different kinds of vocational programs in which, while the activities were somewhat similar, the content varied according to the type of program. The experimental method would also have undermined one of our basic objectives: to obtain useful data in as unobtrusive a manner as possible, thereby allowing us to describe and analyze the communication environment as it actually existed.

Several other criteria of student achievement were considered. Performance on the job, following the student's completion of a program, would provide some indication of achievement. However, contacting employers about their perceptions of student performance was simply not feasible. Even if such information were readily available, some consideration would have to be made for individual differences among students and programs. Nevertheless, on-the-job performance is an important criterion and one which we would like to have included.

Another way student achievement can be inferred is from licensing examinations which are taken following the completion of certain vocational programs. These examinations are standardized statewide and therefore provide some insight into the effectiveness of the teacher. Variations among students would again have to be considered. Unfortunately, none of the programs included in our study required a licensing examination. We

believe, however, that some type of standardized achievement test, despite the difficulty in developing it, would be extremely valuable in assessing and maintaining the quality of instruction in vocational education programs. This kind of information combined with an employer's perception of students' on-the-job performance would constitute important criteria for gauging teaching effectiveness.

Observers

One of the most important preliminary aspects of the study was the selection and training of observers to collect the data. Since the measuring instruments included subjective as well as objective data, we believed that individuals trained in a communication discipline would be more perceptive, and hence, more skillful in their recording of communication behavior. Subsequently, two graduates (one male and one female) of the Communication Arts program at the University of West Florida were employed and subjected to a rigorous training program. One of the observers had previously spent three months testing and refining the data gathering instruments and procedure and was therefore familiar with most aspects of the study.

Following a brief orientation period, the two observers spent approximately four weeks observing and recording communication in various classroom and shop situations. (Teachers who participated in the training phase from these programs were not included in the study.) At first, the objective was simply to familiarize the untrained observer with the various instruments and the standard procedure for administering them and to allow both observers to gain some experience in coding. During this period observers worked together so that variations in coding could be noted and resolved. For example, at times the teacher may have been talking to one student and interrupted momentarily. ("Momentarily" was defined as less than a half minute.) In situations such as these, when the teacher's actions indicated that he was still maintaining contact with the former student, the decision was made to code that contact as a single interaction.

Most of the coding problems were very minor and after the observers had gained sufficient experience in using the instruments, the next and most critical step was to establish intra- and inter-observer reliability. Also of importance, of course, is the reliability of the teacher, that is, the degree to which his behavior remains consistent from day to day. Since we were using one male and one female observer, we were especially interested in the possible effects of sex differences on teacher and student behavior.

Two kinds of data were used in computing reliability, and three types of reliability were recorded:

1) reliability between the scores of different observers observing the same teacher at the same time.

2) reliability between the scores of the same observer observing the same teacher at different times.

3) reliability between the scores of different observers observing the same teacher at different times.

It should be noted that only the first type of reliability is a function of the observer alone. The other two types of reliability are partly a function of the teacher and partly a function of the observer.

The first few weeks of training revealed that the main coding discrepancies in the shop concerned teacher- and student-initiated contacts. Since these behaviors constituted the majority of the data, reliability was first determined for these scores alone. Since this kind of record necessitated matching the recipients of the contacts, observers listed the students in a similar order on their coding form before they began collecting data. This procedure facilitated computation. However, because the observer had to follow the teacher very closely during the shop session, it was difficult to determine whether an accurate measure of reliability was being obtained. In fact, it is probably safe to assume that observers often cued each other since it was almost impossible for one not to see the other's actions. For this reason, a more reliable method was devised.

During the training program, videotapes of shop and classroom sessions were used in establishing referents for the various intervals of the organization and presentation scales. These tapes were also used to determine inter-rater reliability of teacher- and student-initiated contacts. The procedure was to allow one observer at a time to view the videotape and record the behavior. This method was judged as more reliable since it avoided the problem of cueing. Some reflection of this is found in the product-moment correlation measures. Whereas correlations using the former method were as high as .93, average correlations of the latter were .75.

While the correlations of teacher- and student-initiated contacts indicate to what extent the recorded contacts are attributed to the same individual by each observer, they also indicate whether a contact noted by one observer is also noted by the other one. The latter factor is extremely important since many of the communication indices are based upon the total number of contacts. Results of the total teacher- and student-initiated contacts scores from the videotapes showed, however, that the average difference between observers in total number of contacts recorded was only two. The average time of the videotapes was 22 minutes, and the average number of contacts recorded was 40. In other words, there was a variation in the number of contacts of approximately six an hour or approximately five for each hundred that were recorded.

Although the correlation of observers' simultaneous recordings of contacts in the shop was perhaps invalidated by a cueing effect, the scores of presentation and organization skills, based on the same

session, could still be used in establishing reliability since these ratings were determined privately immediately following the shop session. Product-moment correlations between observers' ratings of these skills ranged from .66 to 1.00. The average correlation was .87.

Following the videotape practice session, observers began working alone, spending two consecutive days with each teacher. The purpose of these observations was to determine in part the degree to which the teacher's behavior varied from day to day. Confounded in this, of course, is the reliability of the observer. Correlations of the two days' observations were derived from the communication indices' scores. Use of these indices, however, necessitated a non-parametric correlational technique. Therefore, in establishing the relationship between scores of observations made by the same observer at different times and scores of observations made by different observers at different times, Scott's coefficient (π) was used.[12] Table I shows the pi coefficients for two teachers observed during the training period.

Medley and Mitzel note that a third kind of correlation, which they call the "reliability coefficient," is necessary to gauge more accurately the behavior being measured.[13] Whereas the correlation between scores based on observations made by different observers at the same time involves only a limited sampling of behavior and the correlation between scores based on observations made by the same observer at different times is most likely to reflect the observer's biases, the other kind of correlation, based on observations made by different observers at different times, gives us the best indication of whether the data reflect accurately the teacher's behavior. This information is shown in Table II.

The greatest variations occurred in the amount of time spent by the teacher in his initiated contacts with the students and the amount of time spent in combined teacher- and student-initiated contacts. For one of the teachers, there was also a substantial difference in the time of interruptions. Whereas the first day's interruptions averaged 14 minutes per hour, the second day's interruptions averaged 34 minutes.

None of the differences found in Table II or for similar instances in which observations were made by different observers at different times seemed attributable to the sex of the observer. While it is likely that the intrustion of a visitor probably caused all teachers to become slightly more energetic, it did not seem to matter whether the observer was a male or female.

One of the most difficult problems in assessing teacher behavior is determining the sampling unit of time. To state the problem another way, how long must a teacher be observed before his overall teaching behavior can be characterized accurately or reliably?

TABLE I

MEASURES AND RELIABILITY COEFFICIENTS BASED ON OBSERVATIONS OF THE SAME TEACHER BY THE SAME OBSERVER ON DIFFERENT DAYS

	Teacher 1 (Same observer)		Teacher 2 (Same observer)	
	1st day	2nd day	1st day	2nd day
Number of teacher-initiated contacts per hour	22.2	21.6	10.9	15.8
Number of teacher-initiated contacts per student per hour	1.5	1.5	2.2	1.8
Number of minutes per hour of teacher-initiated contacts with students	13.2	14.4	25.9	41.4
Number of minutes per student per hour of teacher-initiated contacts with students	.9	1.0	5.2	4.6
Average length of time (minutes) of teacher-initiated contacts	.6	.7	2.4	2.6
Percentage of students contacted during shop session	100	100	100	100
Number of student-initiated contacts per hour	8.1	9.3	2.7	4.7
Average number of student-initiated contacts per hour	.5	.6	.5	.5

TABLE I--Continued

	Teacher 1 (Same observer)		Teacher 2 (Same observer)	
	1st day	2nd day	1st day	2nd day
Number of minutes per hour of student-initiated contacts with teacher	.7	.7	1.7	2.6
Average number of minutes per hour that students spent in initiated contacts with teacher	.1	.1	.3	.3
Average length of time (minutes) of student-initiated contacts	.1	.1	.6	.6
Number of teacher + student-initiated contacts per hour	30.3	31.0	13.6	20.4
Number of teacher + student-initiated contacts per student per hour	2.0	2.0	2.7	2.3
Number of minutes per hour spent in teacher-initiated +student-initiated contacts	13.8	15.1	27.6	44.0
Number of minutes per student per hour spent in teacher-initiated + student-initiated contacts	.9	1.0	5.5	4.9

TABLE I--Continued

	Teacher 1 (Same observer)		Teacher 2 (Same observer)	
	1st day	2nd day	1st day	2nd day
Average length of time (minutes) of teacher-initiated + student-initiated contacts	.5	.5	2.0	2.0
Number of instances of positive reinforcement per hour	19.8	21.4	10.9	7.5
Number of instances of negative reinforcement per hour	4.7	5.2	2.2	4.1
Total number of instances of reinforcement (positive and negative) per hour	24.5	26.6	13.1	11.6
Positive/Negative reinforcement ratio	4.2	4.1	5.0	1.8
Number of instances of banter per hour	3.4	2.7	4.4	2.1
Number of interruptions per hour	1.6	.8	3.9	2.8
Number of minutes per hour spent in interruptions	2.0	1.6	8.6	10.6
Average length of time of interruption	1.3	2.0	2.2	3.7
	π = .94		π = .70	

TABLE II

MEASURES AND RELIABILITY COEFFICIENTS BASED ON OBSERVATIONS OF THE SAME TEACHER BY DIFFERENT OBSERVERS ON DIFFERENT DAYS

	Teacher 1		Teacher 2	
	1st day 1st Observer	2nd day 2nd Observer	1st day 1st Observer	2nd day 2nd Observer
Number of teacher-initiated contacts per hour	24.7	21.4	12.0	16.5
Number of teacher-initiated contacts per student per hour	1.4	1.1	.8	1.1
Number of minutes per hour of teacher-initiated contacts with students	26.1	13.2	24.0	14.4
Number of minutes per student per hour of teacher-initiated contacts with students	1.5	.7	1.6	1.0
Average length of time (minutes) of teacher-initiated contacts	1.1	.6	2.0	.9
Percentage of students contacted during shop session	95	94	80	50
Number of student-initiated contacts per hour	3.3	5.5	8.9	6.2
Average number of student-initiated contacts per hour	.2	.3	.6	.4

TABLE II--Continued

	Teacher 1		Teacher 2	
	1st day 1st Observer	2nd day 2nd Observer	1st day 1st Observer	2nd day 2nd Observer
Number of minutes per hour of student-initiated contacts with teacher	.9	.1	.2	.2
Average number of minutes per hour that students spent in initiated contacts with teacher	.1	.0	.0	.0
Average length of time (minutes) of student-initiated contacts	.3	.0	.0	.0
Number of teacher + student-initiated contacts per hour	27.9	26.9	21.9	22.7
Number of teacher + student-initiated contacts per student per hour	1.6	1.4	1.3	1.5
Number of minutes per hour spent in teacher-initiated + student-initiated contacts	27.0	13.2	24.0	14.4
Number of minutes per student per hour spent in teacher-initiated + student-initiated contacts	1.5	.7	1.5	1.0

TABLE II--Continued

	Teacher 1		Teacher 2	
	1st day	2nd day	1st day	2nd day
	1st Observer	2nd Observer	1st Observer	2nd Observer
Average length of time (minutes) of teacher-initiated + student-initiated contacts	1.0	.5	1.2	.6
Number of instances of positive reinforcement per hour	.9	.0	.4	.4
Number of instances of negative reinforcement per hour	1.2	.5	2.7	2.2
Total number of instances of reinforcement (positive and negative) per hour	2.1	.5	3.1	2.7
Positive/Negative reinforcement ratio	.8	.5	.2	.2
Number of instances of banter per hour	5.6	3.8	4.0	4.0
Number of interruptions per hour	3.9	5.8	3.6	2.2
Number of minutes per hour spent in interruptions	14.1	34.3	14.4	13.8
Average length of time of interruption	3.7	6.0	4.1	6.2
	π = .55		π = .70	

Two of the types of correlations provide some insight into the day-to-day variations of a teacher's behavior. While many of his behaviors as reflected by the communication indices remained quite consistent, especially those, as one might expect, relating to presentation and organization skills, several of the shop indices revealed that the uniqueness of each day's activities caused some fluctuation in the time the teacher devoted to various chores. In some instances this fluctuation might be manifested in the amount of time spent in direct contact with the student, which in turn, might affect the amount of praise and criticism used. Therefore, in order to obtain a more reliable measure of the teacher's behavior, the decision was made to spend two days with each teacher and to average the data accordingly. (Reliability coefficients on first and second day's data are reported in the Results section.)

While we had already intended to allow the observer to spend two days with a teacher, we thought that it would take one day for the observer to familiarize himself with the surroundings and to practice gathering data. It became apparent quite soon, however, that the observers were able to orient themselves in a very short time, thus enabling the recording of both days' behavior. The average time of observation (shop and classroom) during the training period was between four and six hours, a figure which compares favorably with the time interval of other classroom communication studies.[14]

Once the reliability data were deemed satisfactory, observers were ready to go into the field. As an additional precaution, however, in order to control as much as possible potential effects of different observers on obtained differences among types of teachers, we assigned one observer to the northern part of Florida and the other to the southern part, knowing that each section contained relatively the same number of teachers and same types of programs, and that no comparison would be made between teachers from one part of the state with teachers from another part.

Once a sufficient number of the supervisor ratings of teachers had been obtained, a list of names was compiled and given to the observers along with the name of the designated contact person. Whenever the observer moved from one area to the next, he (or she) would usually spend the first day making arrangements (through the appropriate contact) with each teacher for the two days of observation. No attempt was made to conceal the nature of the study; however, observers were instructed to minimize their contact with the teacher and to give only a general briefing on the purpose of the study. The idea was to play down the "evaluation" aspects since in fact the data were for research purposes only. Because of this approach and the fact that, as stated previously, each teacher was assured anonymity, most teachers agreed to participate in the study.

Observers arrived before each shop or classroom session began and after orienting themselves, recorded the time and began collecting data. If a coffee break or a lunch break occurred, the observer again recorded

the time and stopped collecting data for the duration of the break. Also, whenever the session was supposed to be over (at the designated time), the observer stopped collecting data in spite of the fact that some teachers often continued working with individual students beyond the regular ending time. If such an occurrence seemed notable, it was recorded in the narrative. Likewise, whenever a teacher dismissed his students early and the incident seemed to reflect the teacher's attitude, this information as well was included in the narrative description.

At the end of each day's observation, the observer filled out the rating scale instruments and completed the forms that called for descriptive data. On the second day, toward the end of the session, he (or she) administered the teacher Q-sort and the student questionnaire. Sometimes, however, these instruments, and the form that furnished background information about the teacher and his program, had to be administered at a time that was more convenient to the teacher.

Observers mailed their data to the project office approximately every two weeks. A WATS line enabled one of us to contact the observers often and to resolve quickly any irregularities that might have been found, e.g., missing data. It also allowed us to resolve any other problems that might have arisen. We discovered, for example, that a number of teachers were team-teaching. Since this arrangement could not be accounted for by the measuring instruments we had devised, we had to omit from study teachers who had been selected but who were teaching in that kind of situation. The only other recurring problem was scheduling. Holidays, special school activities, or illness of the teacher sometimes forced the observers to rearrange their observation schedules. Despite these impediments, we were able to gather data from 124 teachers over an eight month period.

FOOTNOTES

[1]Donald M. Medley and Harold E. Mitzel, "Measuring Classroom Behavior by Systematic Observation," in Handbook of Research on Teaching, ed. by N. L. Gage (Chicago: Rand McNally and Company, 1963), p. 248.

[2]Florida's Public Education Program (Tallahassee: Florida Department of Education, 1971-72), p. 57.

[3]Also excluded from study were teachers in the Manpower Development Training programs. While the activities of these teachers were not necessarily different from the kinds of activities that take place in other programs, we decided to omit from study teachers in unique programs such as the exemplary and MDT in order to avoid possible extraneous influencing factors.

[4]Industrial Education: Directory of Schools and Courses (Tallahassee, Florida Department of Education, 1972).

[5]Ned A. Flanders, Analyzing Teaching Behavior (Reading, Mass.: Addison-Wesley Publishing Company, 1970), p. 37.

[6]A half minute was found to be a convenient unit of time for the observer to note the duration of a contact and still be able to record fully other aspects of communication, e.g., the use of banter, praise, criticism, etc.

[7]For an early account of the social-emotional classroom environment, see John Withal, "The Development of a Technique for the Measurement of Social-Emotional Climate in Classrooms," in Interaction Analysis: Theory, Research, and Application, ed. by Edmund J. Amidon and John B. Hough (Reading, Mass.: Addison-Wesley Publishing Company, 1967), pp. 47-64.

[8]An account of this study is found in Medley and Mitzel, pp. 258-59.

[9]Samuel L. Becker, "Rating Scales," in Methods of Research in Communication, ed. by Philip Emmert and William Brooks (New York: Houghton Mifflin Company, 1970), pp. 213-235.

[10]H. H. Remmers, "Rating Methods in Research on Teaching," in Handbook of Research on Teaching, pp. 329-378.

[11]Fred N. Kerlinger, Foundations of Behavioral Research (2nd ed., New York: Holt, Rinehart and Winston, 1973), pp. 546-549.

[12]William A. Scott, "Reliability of Content Analysis: The Case of Nominal Scale Coding," Public Opinion Quarterly, XIX (Fall, 1955), 321-325.

[13]Medley and Mitzel, pp. 256-264.

[14]A one and a half to two hour observation period was used in a study by C. V. Robbins, "The Principal and His Knowledge of Teacher Behavior," in Interaction Analysis: Theory, Research, and Application, ed. by Edmund J. Amidon and John B. Hough, p. 178. Four "class sessions" constituted the time unit for the study by Bellack et al. Arno A. Bellack, Herbert M. Kliebard, Ronald T. Hyman, and Frank L. Smith, Jr., The Language of the Classroom (New York: Teachers College Press, 1966), p. 11. Loepp used two "class periods" in his study. Franzie Lee Loepp, "The Development of a System to Analyze Teacher-Student Interaction in Junior High School Industrial Arts Classrooms" (unpublished doctoral dissertation, University of Northern Colorado, 1971), p. 28. In another study of vocational education teachers, Kruger scheduled "three observation periods" for each teacher. John M. Kruger, "Interaction Patterns of Indsutrial Arts Teachers in Laboratory Type Situations at the Junior High School Level" (unpublished doctoral dissertation, University of Colorado, 1971), p. 26.

RESULTS

Description of Subjects

All the teachers observed in this study were male and came from a variety of Industrial Education programs. Table III shows that almost half the sample was comprised of Auto Mechanics and Air Conditioning and Heating Mechanics instructors while another third were in either Auto Body Repair, Machine Shop Work, or Welding. The majority of the remaining instructors were in other mechanics-type programs: Aviation Mechanics, Gasoline Engine Mechanics, Marine Engine Mechanics, Diesel Mechanics, or Diversified Mechanics. Only one instructor was selected from each of the other programs: Agricultural Mechanics, Millwork Shop, Plumbing, and Sheet Metal. The reason that so few teachers were represented in the latter programs is that they comprise only a small proportion of the Industrial Education programs in the state.

The programs were located in three types of schools (Table IV); however, in some cases secondary school classes were bussed to a vocational-technical center. For situations such as these, we designated the teacher as having come from a secondary school.

Table V shows a breakdown of teachers according to age. While the mode fell in the 50-59 year old interval, the average age of the teachers was 47. Despite a relatively high mean age, the majority of teachers had less than five years teaching experience (Table VI). One explanation for this is that practical experience is such an important prerequisite for teaching in these type programs; consequently, older persons are likely to have had more work experience and are therefore more likely to be "qualified" to teach. Some evidence of the relationship among age, teaching experience, and practical experience is found in Table VII. Although the correlation between age and teaching experience was .40, for all age categories except the last one (60-69), the mode of teaching experience fell in the 0-5 year interval.

The mode for practical experience also varied according to age ($r = .55$). Most teachers under 30, as might be expected, had less than 10 years practical experience. The majority of teachers between 30 and 39 had 10-19 years of practical experience whereas the majority of teachers in the age category 40-49 had 20-29 years of practical experience. The mode for teachers in the next age category, 50-59, also fell in the 20-29 year work experience category. In the last age interval, 60-69, an equal number of teachers was found in the latter three categories of practical experience. No teacher in this age group had less than 10 years practical experience.

TABLE III

NUMBER OF TEACHERS FROM EACH INDUSTRIAL EDUCATION PROGRAM

Program	Number of Teachers (N=124)	Per cent
Auto Mechanics	35	28
Air Conditioning and Heating Mechanics	22	17
Auto Body Repair	15	12
Machine Shop Work	12	10
Welding	12	10
Aviation Mechanics	8	6
Gasoline Engine Mechanics	7	6
Marine Engine Mechanics	4	3
Diesel Mechanics	3	2
Diversified Mechanics	2	2
Agricultural Mechanics	1	1
Millwork Shop	1	1
Plumbing	1	1
Sheet Metal	1	1

TABLE IV

NUMBER OF TEACHERS FROM EACH TYPE OF SCHOOL

School	Number of Teachers (N=124)	Per cent
Secondary School	47	38
Vocational-Technical Center	55	44
Community College	22	18

TABLE V

AGE OF TEACHERS

Age interval	Number (N = 124)	Per cent
20-29	8	7.0
30-39	19	15.0
40-49	43	35.0
50-59	45	36.0
60-69	9	7.0

TABLE VI

TEACHING EXPERIENCE

Range (in years)	Number of Teachers (N = 124)	Per cent
0 - 5	68	55
6 - 11	34	27
12 - 17	8	6
18 - 23	6	5
24 - 29	6	5
30 - 35	2	2

Average number of years of teaching experience = 7.5 years

TABLE VII

NUMBER OF TEACHERS ACCORDING TO AGE, PRACTICAL (WORK) EXPERIENCE, AND TEACHING EXPERIENCE*

Teachers 20-29 years old

Practical Experience	Years of Teaching Experience					
	0-5	6-11	12-17	18-23	24-29	30-35
Less than 10 years	5					
10-less than 20	2	1				
20-less than 30						
30 years or more						

Teachers 30-39 years old

Practical Experience	Years of Teaching Experience					
	0-5	6-11	12-17	18-23	24-29	30-35
Less than 10 years	3	1				
10-less than 20	12					
20-less than 30	3					
30 years or more						

Teachers 40-49 years old

Practical Experience	Years of Teaching Experience					
	0-5	6-11	12-17	18-23	24-29	30-35
Less than 10 years	1	1				
10-less than 20	4	5	2			
20-less than 30	16	6	1	2	1	
30 years or more	2	1			1	

TABLE VII--Continued

Teachers 50-59 years old

Practical Experience	Years of Teaching Experience					
	0-5	6-11	12-17	18-23	24-29	30-35
Less than 10 years			1		1	
10-less than 20	2	3		1	1	
20-less than 30	8	10	2	1	1	
30 years or more	9	4				1

Teachers 60-69 years old

Practical Experience	Years of Teaching Experience					
	0-5	6-11	12-17	18-23	24-29	30-35
Less than 10 years						
10-less than 20		2			1	
20-less than 30		1	1	1		
30 years or more	1			1		

*The correlation between age and practical experience was .55.
The correlation between age and teaching experience was .40.
The correlation between practical experience and teaching experience was .09.

The low correlation between practical experience and teaching experience (r = .09) is reflected in the table. Of the 68 teachers who had less than five years teaching experience, the mode for practical experience fell in the 20-30 year category. For the 35 teachers who had 6-11 years teaching experience, the mode for practical experience was also found in the 20-30 year category.

Approximately half the teachers in the sample had only one year or less of education beyond the secondary school level (Table VIII). Perhaps because of the availability of college level courses, community college teacher had on the average more years of academic work than did teachers in the secondary schools or the vocational-technical centers. For all teachers, the average number of vocational courses taken was eight. Teachers had in addition to the vocational courses an average of one course each in psychology and communication.

Only seven per cent of the teachers in our sample were black (n = 9). The majority of them taught in either Auto Mechanics or Auto Body Repair programs. Of the nine black teachers, seven were found in secondary schools and two in vocational-technical centers. While no black instructors came from community colleges, that type school included the smallest proportion of teachers in the sample (18%).

Average age and practical experience of the black teachers were approximately the same as the averages for the entire sample; however, black teachers averaged almost 16 years of teaching experience, over twice the amount for all teachers (7.5 years). They also reported an average of 3.7 years schooling beyond the secondary level, a figure which again was almost twice the sample average (1.9 years).

The entire sample of teachers had taught at their present school an average of 4.3 years. Twenty of the teachers (16%) had been there for only a year or less. These teachers resembled the entire sample in terms of work experience, age, and formal education. However, they had approximately three fewer years of teaching experience. In fact, half of them were in their first or second year of teaching. The average age of these teachers (40) was less than the average for the entire sample. Also, these teachers had slightly less practical experience (19 years) than the entire sample. They averaged one year of formal education beyond the secondary level, and 90 per cent of them (9) were white.

Based on the preceding information, the following conclusions were drawn about the teachers who were observed.

1. Over two-thirds of the teachers observed were from mechanics-type programs. Most of the other teachers came from Auto Body Repair, Machine Shop Work, and Welding.

2. The largest percentage of teachers were located in vocational-technical centers. A relatively similar percentage came from secondary schools, while less than 20 per cent of the teachers came from community colleges.

TABLE VIII

ACADEMIC BACKGROUND OF TEACHERS

	Secondary School (n = 47)		Vocational-Technical (n = 55)		Community College (n = 22)	
Years of education beyond secondary level	Number	Per cent	Number	Per cent	Number	Per cent
0	11	23	16	29	3	14
1	12	26	15	27	3	14
2	5	11	12	22	9	41
3	7	15	5	9	4	18
4	3	6	4	7	2	9
more than 4	9	19	3	6	1	4

3. The teacher's age was related to the number of years of practical experience ($r = .55$) and also to the number of years of teaching experience ($r = .40$).

4. Despite an average age of 47, the majority of teachers had less than five years teaching experience.

5. One-fourth of the teachers in our sample had no formal education beyond the secondary school level. Another fourth had at least one year of higher education, while 10 per cent had more than four years. Community college teachers averaged more years of formal education than teachers from either the vocational-technical centers or the secondary schools.

6. Teachers had an average of eight vocational courses and one course each in psychology and communication.

7. Seven per cent of the teachers in the sample were black, and the majority of them taught in either Auto Mechanics or Auto Body Repair programs. The black teachers had about twice as much teaching experience and formal education as the entire sample. In all other respects, e.g., age, practical experience, etc., the black teachers approximated the average for the entire sample.

8. Teachers had been in their present location for an average of four and a half years.

9. Ten teachers were in their first or second year of teaching. These teachers were somewhat younger than the average for the entire sample and had slightly less work experience.

Reliability of Measures

To determine which measures of communication were most consistent from day to day, and hence most reliable, we compared the data from the first day's observation with that from the second. A correlation coefficient was computed for each item from the communication measuring instruments. The computation was based on all teachers' scores on the first day (for a particular item) compared to their scores on the second day.

Results of the correlation analyses showed that the shop communication measures involving teacher and student contacts were fairly reliable. Highest coefficients were obtained for the number of teacher- and student-initiated contacts per hour (.74) and the number of teacher- and student-initiated contacts per hour adjusted for the number of students in the class (.73). The average number of student-initiated contacts also showed a high correlation (.69) as did the number of teacher-initiated contacts per student (.60). The measures involving the average time of these contacts were less reliable.

The indices of reinforcement behavior were also fairly reliable, ranging from .58 to .69. The highest correlation was for the number of instances of positive reinforcement per hour; and the lowest was for the number of instances of negative reinforcement. Interestingly, though each of these two measures of reinforcement is relatively reliable, they do not correlate well with each other--only .11. (This latter correlation is based on the combined data from both days.)

While the number of instances of banter proved to be highly reliable ($r = .80$), the measures of interruption and percentage of students contacted were much less so. Correlations for the interruption measures ranged from .59 (average number of interruptions per hour) to .22 (average length of interruptions). The correlation for percentage of students contacted was .34.

The reliability of the rating scale items for the shop session was excellent, though this may have been due in part to the fact that the observers remembered from one day to the next how they assessed the teacher's skills. Correlations for these items ranged from .54 to .86. The correlations for the percentage of time the teacher kept an obstacle between himself and his student and the noise level in the shop were also relatively high (.68 and .73). Items comprising the classroom rating form were less reliable than the shop items. The highest correlation was for fluency (.91), and the lowest was for appearance of self-confidence (.28).

Another way in which we examined reliability was to correlate each teacher's scores of the first day (on all communication items) with his scores on the second day. In performing these analyses, we used only the 24 shop communication indices since they were the measures that were least likely to have been affected by observer recall. Also, instead of using a non-parametric correlation technique as we did during the training phase of our study, we normalized the data (using the sample mean and standard deviation of each item as a basis for transformation) and performed product-moment correlations.

Of the 121 coefficients obtained (for the 121 teachers who had shop sessions on both days), 78 of them (64.5%) were positive and significant at the .05 level of confidence. The correlations ranged from .98 to -.47; however, only six were negative. Approximately half the coefficients (59) were .60 or higher. Based on the analyses of the separate items, we would suspect that the non-significant correlations were due mainly to the variability of those items concerning duration of contacts, interruptions, and percentage of students contacted.

While the reliability data presented in this section were not obtained by comparing the scores of one two-day observation period with those of another (the best means of testing the reliability of our data), they nevertheless give some indication of the consistency among the various communication measures and suggest the fruitfulness of our using the two-day period for collecting data. Perhaps in a future study we can determine more precisely the degree to which precision (reliability) is increased by extending the observation period.

Construction of Indices

In order to further increase the reliability of our communication measures, the data generated by each instrument were subjected to a factor analysis.[1] An orthogonal rotation was used, and based on the factor scores items were combined into various communication indices. The same procedure was used for the teacher attitude measure.

Shop Communication Skills. The results of the factor analysis of the 24 shop communication measures are shown in Table IX. Eight factors were generated, although for three of the factors only one item had a heavy loading. The first factor was comprised of six items, each of which concerned the number of contacts (and number of contacts per student) made by teachers and students. Since the contact scores for teachers and students were combined in the last two items, we used these as our index and omitted the other four items. We labelled this factor "Teacher and Student Contacts."

The second and third factors showed that the duration of teacher- and student-initiated contacts loaded on different factors. Therefore, we chose as an index of "Teacher Contact Time" the first two items (number of minutes of teacher-initiated contacts and number of minutes per student) on the second factor. For the index of "Student Contact Time" we selected the three items (number of minutes of student-initiated contacts, average number of minutes, and average length of contacts) that loaded heaviest on the third factor.

We called the fourth factor the "Positive Reinforcement" index. The items comprising this index were: 1) number of instances of positive reinforcement per hour; 2) the positive/negative reinforcement ratio; and 3) banter.

Only one item had a pure loading on the fifth, sixth, and seventh factors. The item for the fifth factor was the number of interruptions per hour, while the item for the sixth was the number of instances of negative reinforcement per hour. The seventh factor was comprised of the average length of time of teacher- and student-initiated contacts.

The last factor was labelled the "Interruption Time" index and was comprised of the average length of time of interruptions and number of minutes per hour spent in interruptions. While some items, such as the last one, had no pure loading and were therefore not included in any of the combined indices, they were retained and included in a later analysis.

To derive the raw score for an index, the data were first normalized using the sample mean and standard deviation of each item as the basis for transformation. The normalized data of each item in the index were then added together to yield the raw score.

TABLE IX

FACTOR ANALYSIS OF COMMUNICATION INDICES

	N = 123	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
Teacher-initiated contacts with students	Number of teacher-initiated contacts per hour	.67*	.12	-.43	.30	-.01	-.10	-.15	.22
	Number of teacher-initiated contacts per student per hour	.57*	.25	-.20	.14	-.52	-.01	-.05	-.17
	Number of minutes per hour of teacher-initiated contacts with students	-.07	.92*	-.21	.01	.02	.02	.07	.21
	Number of minutes per student per hour of teacher-initiated contacts with students	.07	.73*	-.12	.08	-.11	.08	-.57	-.02
	Average length of time (minutes) of teacher-initiated contacts	-.31	.53*	.05	-.28	-.42	-.11	-.07	-.05
	Percentage of students contacted during shop session	.27	.34	.03	.35*	.30	.14	.08	-.33

TABLE IX--Continued

		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
Student-initiated contacts with Teacher	Number of student-initiated contacts per hour	.66*	-.26	.22	-.06	.25	-.35	.14	.28
	Average number of student-initiated contacts per hour	.69*	-.15	.33	-.10	.10	-.11	.06	.07
	Number of minutes per hour of student-initiated contacts with teacher	.10	-.04	.91*	-.06	.11	-.15	.08	.13
	Average number of minutes per hour that students spent in their initiated contacts with teacher	.13	-.01	.90*	-.06	.00	.01	.00	-.15
	Average length of time (minutes) of student-initiated contacts	-.32	.19	.79*	.05	.01	.01	.05	-.03

TABLE IX--Continued

		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
Combined teacher and student contacts	Number of teacher- and student-initiated contacts per hour	.80*	-.07	-.21	.22	.10	-.25	.17	.27
	Number of teacher- and student-initiated contacts per student per hour	.86*	.10	.01	.29	-.22	-.05	-.03	-.03
	Number of minutes per hour spent in teacher-initiated and student-initiated contacts	-.03	.91*	.12	-.01	.06	-.04	.11	.26
	Number of minutes per student per hour spent in teacher-initiated and student-initiated contacts	.08	.84*	.26	.04	-.21	.11	-.14	-.04
	Average length of time (minutes) of teacher-initiated and student-initiated contacts	-.10	.02	-.06	.10	.10	.02	-.89*	.04

TABLE IX--Continued

		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
Positive and negative reinforcements	Number of instances of positive reinforcement per hour	.09	.07	.02	.87*	-.11	-.37	-.13	-.01
	Number of instances of negative reinforcement per hour	.26	-.01	.06	-.02	.11	-.88*	.07	-.03
	Total number of instances of reinforcement (positive and negative) per hour	.20	.07	.06	.67	-.05	-.69*	-.07	-.05
	Positive/Negative reinforcement ratio	.03	-.05	-.04	.87*	-.14	.08	-.15	.05
Banter	Number of instances of banter per hour	.23	.13	-.12	.70*	-.01	.13	.12	.14
Interruptions	Number of interruptions per hour	.02	-.06	.08	-.27	.71*	-.15	-.15	-.27
	Number of minutes per hour spent in interruptions	-.17	-.20	.03	-.03	-.03	-.00	.08	-.81*
	Average length of time of interruptions	-.19	-.19	.04	-.19	.44	-.08	-.07	-.72*

*Loads heaviest on this factor

Items from the rating scale were also subjected to a factor analysis; however, because so few teachers had a classroom session, only the shop items and those concerning presentation skills were included in the analysis.[2] The reason that the latter items were included was that delivery skills were assessed regardless of whether a classroom session was held.

Table X shows the two factors that emerged from the analysis. The first factor was labelled Dynamism and the index was comprised of the following items: 1) keeps everyone busy; 2) general vigor and enthusiasm; 3) skill at clarifying directions; 4) appearance of self-confidence; and 5) ability to create proper social-emotional environment. The other factor was labelled Delivery since it was comprised of the various aspects of vocal quality: 1) loudness; 2) vocal rate; 3) fluency; and 4) vocal variation. The last two items, bodily action (gesture and eye contact) and appropriateness of language had the lowest and most evenly divided factor loadings; therefore, for our various analyses these items were analyzed separately.

Responses to the Teacher Q-Sort Instrument. The statements which teachers rank ordered provided for two types of analyses. First, we performed a Q-factor analysis to identify types of teachers (according to their attitude towards various aspects of teaching) and to ascertain whether teacher-type was related to communication behavior or the various measures of teaching effectiveness. We found, however, no evidence to support this notion. (An explanation of the Q-analysis is presented in Appendix L.) Therefore, we did an R-factor analysis of the Q-sort items and used the results of this analysis to determine the relationship between various dimensions of teacher attitude and our teaching effectiveness criteria. This procedure, as will be shown later, proved to be the more fruitful approach to understanding the relationship between the teacher's attitude and his effectiveness as a teacher.

As the table of mean scores on the Q-sort items shows (Table XI), responses to most of the attitude items in the instrument appear to be pretty well distributed, indicated by the fact that the means of most of them cluster in the 10 to 15 range (on a 1 to 24 possible range). The four items most disagreed with show negative attitudes toward the students ("The primary function of this school is to keep these kids off the streets and out of trouble" and "Students in this school generally tend to be misfits") and a dislike of teaching ("If I could earn as much money in another occupation, I would stop teaching" and "If I could plan my career again, I would not choose teaching"). Note, however, that the mean scores for these items are not especially high--15.3 to 16.2--which indicates that the majority of teachers did not select these items as the ones they most disagreed with.

The items most agreed with are almost mirror images of those most disagreed with. The highest ranked items are "Teaching gives me a great

TABLE X

FACTOR ANALYSIS OF ORGANIZATION AND PRESENTATION SKILLS

N = 123	Factor 1	Factor 2
Keeps everyone busy	.05	-.82*
General vigor and enthusiasm	.45	-.72*
Skill at clarifying directions	.45	-.66*
Appearance of self-confidence	.45	-.65*
Ability to create proper social-emotional environment	.02	-.80*
Loudness	.83*	-.16
Rate	.86*	-.08
Fluency	.71*	-.19
Vocal variation	.79*	-.33
Bodily action	.59*	-.43
Appropriateness of language	.20	-.35*

*Loads heaviest on this factor

TABLE XI

Q-SORT ITEMS RANKED FROM GREATEST TO LEAST AGREEMENT

(Low Scores Indicate Greater Agreement: 24 = low, 1 = high)

Mean	Item	S. D.
4.3	Teaching gives me a great deal of personal satisfaction.	3.2
5.3	I find my contacts with students, for the most part, highly satisfying and rewarding.	2.9
5.5	To me there is no more challenging work than teaching.	4.5
5.9	I feel reasonably successful in my present position.	2.4
6.6	I feel that I am an important part of this school system.	3.5
6.7	Teaching enables me to make my greatest contribution to society.	4.1
7.1	Most of the students in this school are very likeable.	3.2
8.1	The teachers in our school cooperate well with each other to achieve personal and school goals.	3.6
8.6	The programs in our school make reasonable provision for individual differences among students.	3.6
8.7	Our school has a well-balanced curriculum.	3.8
9.5	The teachers in this school are among the hardest-working group of people I know.	3.7
10.2	The procedures for teachers to obtain materials and services are well defined and efficient in this school.	4.8

TABLE XI--Continued

Mean	Item	S. D.
10.5	Teaching affords me the security I want in an occupation.	4.3
10.7	I would recommend teaching as an occupation to students of high scholastic ability.	4.4
10.9	Salary policies are administered in this school district with fairness and justice.	3.9
11.1	In this school, I cannot insist on as high a standard in student performance as I would like.	4.8
12.1	This school doesn't provide its teachers with adequate classroom supplies and equipment.	4.9
13.0	I think I am underpaid for what I do in this school.	4.7
13.3	The curriculum of our school is in need of major revision.	3.9
13.9	I do not want to be close personal friends with most of the teachers in this school.	3.9
14.6	Teachers in this school are not as competent as those in some other schools with which I am familiar.	3.4
14.8	This community expects its teachers to meet unreasonable personal standards.	3.2
14.8	The number of hours a teacher must work is unreasonable.	4.2
14.9	Our community makes its teachers feel as though they are not really part of the community.	3.5

TABLE XI--Continued

Mean	Item	S. D.
15.1	The head of our school does not understand or recognize good teaching.	4.7
15.3	Students in this school generally tend to be misfits.	4.0
15.4	If I could plan my career again, I would not choose teaching.	3.9
15.8	If I could earn as much money in another occupation, I would stop teaching.	3.5
16.2	The primary function of this school is to keep these kids off the streets and out of trouble.	3.9

deal of personal satisfaction," "I find my contacts with students, for the most part, highly satisfying and rewarding," "To me there is no more challenging work than teaching," and "I feel reasonably successful in my present position." The mean scores for these statements ranged from 4.3 to 5.9, which indicates that most teachers did rank them at or near the "Most agree with" end of the continuum.

Thus it appears clear that the level of satisfaction with teaching and with the students in these schools is reasonably high. Whether it is higher than that which one would find among any group of secondary school and junior college teachers or among teachers in other types of vocational programs we cannot say, of course, on the basis of the data from this study, since we did not gather information from teachers other than those in Industrial Education programs.

Three factor analyses were made of these data in order to estimate the dimensions of attitude represented in the particular items used. For each analysis the minimum eigen value was set at 2.2 and a varimax rotation was used. Three, five, and ten-factor solutions were obtained. On the basis of the relative independence of factors, the amount of variance accounted for, and the face validity of factors, we decided that the five-factor solution was the best one. The factor structure is shown in Table XII. For each factor, the items are listed in rough order from those which most clearly define the factor to those which least clearly do so. This ranking is based not only on factor weights but also upon relative independence from other factors.

Factor 1 appears to reflect primarily relative satisfaction with the school and its operation. Factor 2 seems to be a measure of a person's relative satisfaction with teaching in general whereas Factor 3 is clearly a measure of one's liking for students. Factor 4 is almost a mirror image of Factor 2, indicating degree of dislike of teaching or, perhaps more accurately, regret at being a teacher. Factor 5 is also closely related to one's satisfaction with teaching, though it has more to do with one's perception of or satisfaction with the status of teachers.

Analyses of Communication and Attitude

One of the main purposes of our study was to determine the extent to which our criteria for teaching effectiveness related to specific communication behaviors. To do this, we first rank ordered teachers according to each teaching effectiveness criterion, e.g., supervisor evaluation scores, etc., and then divided the rank ordered scores into high, moderate, and low evaluation groups and used an analysis of variance to test whether the groups differed significantly on the various measures of communication and attitude. A similar procedure was used to analyze the effects of class size on those measures that were most likely to vary with the number of students in a program. Finally, dividing teachers and students into racial groups allowed us

TABLE XII

FACTOR STRUCTURE OF TEACHER ATTITUDES

Factor 1 Satisfaction with the School					
Loading		Loading on other factors			
		2	3	4	5
.68	Our school has a well-balanced curriculum.	-.22	.09	.11	.05
.61	The procedures for teachers to obtain materials and services are well defined and efficient in this school.	-.19	-.08	.09	.10
-.47	The curriculum of our school is in need of major revision.	.06	.01	-.03	.02
-.48	This school doesn't provide its teachers with adequate classroom supplies and equipment.	-.04	.03	.10	-.05
.48	The teachers in this school are among the hardest-working group of people I know.	.04	-.19	-.25	-.11
-.40	Students in this school generally tend to be misfits.	-.17	-.18	.04	.02
-.37	In this school, I cannot insist on as high a standard in student performance as I would like.	-.09	-.09	-.21	-.07
-.32	The head of our school does not understand or recognize good teaching.	-.04	.17	.12	-.17

TABLE XII - Continued

Factor 1						
Satisfaction with the School						
Loading		Loading on other factors				
		2	3	4	5	
-.24	I think I am underpaid for what I do in this school.	-.16	.12	.14	-.13	
.11	Salary policies are administered in this school district with fairness and justice.	.02	.06	-.04	.04	
Factor 2						
Satisfaction with Teaching						
Loading		Loading on other factors				
		1	3	4	5	
.59	Teaching gives me a great deal of personal satisfaction.	-.02	.08	-.17	.08	
.43	To me there is no more challenging work than teaching.	.04	-.05	-.11	.08	
-.54	The programs in our school make reasonable provision for individual differences among students.	.36	.14	-.17	.05	
.37	This community expects its teachers to meet unreasonable personal standards.	.01	.04	.08	-.21	

TABLE XII - Continued

Factor 2 Satisfaction with Teaching					
Loading		Loading on other factors 1	3	4	5
.49	Teaching enables me to make my greatest contribution to society.	.12	-.17	-.05	-.36

Factor 3 Liking for Students					
Loading		Loading on other factors 1	2	4	5
.68	I find my contacts with students, for the most part, highly satisfying and rewarding.	.10	-.03	-.09	.05
.64	Most of the students in this school are very likeable.	.19	-.26	.09	-.10
-.49	The teachers in our school cooperate well with each other to achieve personal and school goals.	.27	-.27	-.17	.01

TABLE XII - Continued

Factor 4 Regret at being a Teacher					
Loading		Loading on other factors			
		1	2	3	5
.63	If I could earn as much money in another occupation, I would stop teaching.	-.06	.04	-.26	-.13
.56	If I could plan my career again, I would not choose teaching.	-.04	-.28	.04	.14
-.26	The primary function of this school is to keep these kids off the streets and out of trouble.	-.11	.08	-.05	.00
-.33	I would recommend teaching as an occupation to students of high scholastic ability.	.07	-.24	-.19	.17
.29	Teachers in this school are not as competent as those in some other schools with which I am familiar.	-.26	.05	.20	-.11
.37	I do not want to be close personal friends with most of the teachers in this school.	-.22	.10	.36	.36
-.22	I feel that I am an important part of this school system.	.15	.16	-.21	-.03

TABLE XII - Continued

Factor 5 Perception of Status					
Loading		Loading on other factors			
		1	2	3	4
-.53	Our community makes its teachers feel as though they are not really a part of the community.	-.04	-.02	-.12	-.10
.31	I feel reasonably successful in my present position.	.09	.11	-.00	-.08
-.37	The number of hours a teacher must work is unreasonable.	.02	.20	.03	-.02
.36	Teaching affords me the security I want in an occupation.	.23	-.07	-.23	-.13

to determine whether, according to the communication measures, there was an interaction between the race of the teacher and the race of his students.

Supervisor Evaluation Scores. Five items scaled from 1 (low) to 3 (high) comprised the supervisor evaluation score (Appendix D). The sum of the item scores was divided by the number of items checked to yield an overall score.[3] Thus, the highest possible score was 3.00 and the lowest was 1.00.

We had intended to divide the rank ordered scores into three groups: 1) the upper quartile; 2) the middle 50%; and 3) the lower quartile. However, 47 teachers received the maximum score; therefore, for the analyses made according to supervisor evaluation scores, a different method of grouping was employed.

Since the supervisor evaluation measure consisted of five items scored from 1 to 3, each item score of 2 resulted in an overall drop of .2. That is, if four of the items received a score of 3 and one of the items received a 2, the average score was 2.8 or .2 less than 3. If all the items were scored one scale interval less than 3, the average score was 2. Thus, the difference between an overall score of 2 and 3 represented an average of one scale interval difference per item.

Using this rationale, we divided teachers into three groups: 1) those that had a perfect supervisor evaluation score (n = 47); 2) those that had a score below 3.00 but above 2.00 (n = 53); and 3) those that had a score of 2.00 or less (n = 23). One teacher, who had no shop sessions on either day of observation, was dropped from the analyses; therefore, the total sample consisted of 123 teachers.

In most cases, the backgrounds of the teachers in the three groups were quite similar (Table XIII). Those who received high supervisor ratings were slightly younger than teachers in the other groups but had slightly more practical experience. Interestingly, those teachers who received low ratings had an average of more years teaching experience than either the moderate or high evaluation groups.

Table XIV shows further evidence of the similarities among the three groups. Teachers in the low evaluation group had a somewhat lower drop rate but a higher absentee rate than teachers in the other groups. Students of the low evaluation teachers were about a year younger than students of teachers in the other groups but had completed relatively the same number of years of schooling and had been under the teacher's instruction for approximately the same number of months.[4] The average number of students in the classes of the three groups was also similar.

In order to determine whether the three groups of teachers differed according to communication behaviors, a one-way analysis of variance was performed for each of the communication indices.[5] For all the analyses, the accepted level of significance was set at .05.

TABLE XIII

BACKGROUND OF TEACHERS DIFFERENTIATED
ACCORDING TO SUPERVISOR EVALUATION SCORES*

	Teachers with High Supervisor Ratings (n = 47)	Teachers with Moderate Supervisor Ratings (n = 53)	Teachers with Low Supervisor Ratings (n = 23)
Years of practical experience	21.4	20.1	21.0
Years of education beyond the secondary level	1.9	1.7	2.4
Number of courses in vocational education	6.2	7.4	12.0
Number of courses in communication	.9	.8	.8
Number of courses in psychology	1.4	.9	1.7
Years of teaching experience	6.7	6.4	10.5
Years teaching current subject matter	4.8	6.0	10.0
Years at current school	4.0	4.2	5.3
Age	45.9	46.2	49.5

*Average supervisor evaluation scores for teachers in the high evaluation group was 3.00; for teachers in the middle group, 2.50; and for teachers in the low group, 1.74.

TABLE XIV

TEACHERS DIFFERENTIATED ACCORDING TO SUPERVISOR EVALUATION SCORES--
INFORMATION ON PROGRAM AND STUDENTS

	Teachers with High Supervisor Ratings (n = 47)	Teachers with Moderate Supervisor Ratings (n = 53)	Teachers with Low Supervisor Ratings (n = 23)
Percentage of students who dropped out of previous program*	13.5	14.5	9.3
Percentage of students absent	14.7	15.1	15.8
Average age of students	22.3	22.1	21.4
Average number of months under teacher's instruction	7.3	7.6	7.0
Average number of years of education	11.0	11.0	10.7
Average number of students in the class	12.6	12.5	13.1

*Students who left a program to take a skills-related job were not counted as having dropped out.

The results showed significant differences for Dynamism ($F = 3.77$, $p < .05$), Delivery ($F = 3.07$, $p < .05$), Bodily Action ($F = 3.77$, $p < .05$), and Teacher Contact Time ($F = 4.78$, $p < .025$). Table XV shows that teachers in the high and moderate evaluation groups were judged as significantly more dynamic than teachers in the low evaluation group.[6] (A lower mean score represented a higher rating.) Differences between teachers in the high evaluation group and those in the moderate group were not significant.

An analysis of the means for Delivery revealed that teachers in the high evaluation group possessed significantly better delivery skills (indicated by lower scores) than teachers in the low evaluation group (Table XVI). Differences between teachers in the high and moderate evaluation groups and also between the moderate and low evaluation groups were not significant.

Bodily action (gesture and eye contact) also revealed significant differences between teachers in the high and low evaluation groups (Table XVII).[7] Like the results on the Dynamism factor, significant differences were found between teachers in the moderate and low evaluation groups. In this analysis, as in the previous ones, the lower mean score indicates the more favorable rating.

Analyses of variance were also performed for the shop communication measures that were first normalized before being combined into various indices of communication. The only significant difference was found for the index of Teacher Contact Time. Teachers in the low evaluation group spent significantly less time with students than teachers in either the moderate evaluation group or the high evaluation group (Table XVIII).

Since these data have been normalized using the mean and standard deviation of the entire sample as a basis for transformation, the mean value for each item in the index is 0 and the standard deviation is 1. Thus, it can be seen that the high evaluation group spent considerably more than the average amount of time in direct contact with their students than did teachers in the other groups. Teachers in the moderate evaluation group spent slightly above the average amount of time with their students, while the negative value for teachers in the low evaluation group indicated that these teachers spent considerably less than the average amount of time in direct contact with their students.

While the items that were normalized and then combined into various indices yielded more reliable data than might otherwise have been obtained, the transformations make it difficult to interpret the results in terms of the average number of minutes per hour or the average number of contacts, etc. Therefore, a separate analysis was made for each behavior individually (Table XIX). These analyses, which included items that were not combined into indices, allow us to obtain a more useful understanding of the differences among the three groups in terms of various communication skills. As expected,

TABLE XV

TABLE OF DIFFERENCES FOR
TEACHERS DIFFERENTIATED ACCORDING TO SUPERVISOR EVALUATION SCORES--
DYNAMISM*

	Teachers with Moderate Supervisor Ratings	Teachers with Low Supervisor Ratings ($\bar{X}$ = 12.72)
Teachers with high supervisor evaluation ratings ($\bar{X}$ = 10.79)	.14	-1.93**
Teachers with moderate supervisor evaluation ratings ($\bar{X}$ = 10.65)		-2.07**

*Items comprising this factor are: 1) keeps everyone busy; 2) general vigor and enthusiasm; 3) skill at clarifying directions; 4) appearance of self-confidence; and 5) ability to create pleasant social-emotional environment.
**Significant

TABLE XVI

TABLE OF DIFFERENCES FOR
TEACHERS DIFFERENTIATED ACCORDING TO SUPERVISOR EVALUATION SCORES--
DELIVERY*

	Teachers with Moderate Supervisor Ratings	Teachers with Low Supervisor Ratings ($\bar{X}$ = 10.87)
Teachers with high supervisor evaluation ratings (X = 9.17)	-.93	-1.70**
Teachers with moderate supervisor evaluation ratings (X = 10.10)		- .77

*Items comprising this factor are: 1) vocal loudness; 2) vocal rate; 3) fluency; and 4) vocal variation.
**Significant

TABLE XVII

TABLE OF DIFFERENCES FOR
TEACHERS DIFFERENTIATED ACCORDING TO SUPERVISOR EVALUATION SCORES--
BODILY ACTION

	Teachers with Moderate Supervisor Ratings	Teachers with Low Supervisor Ratings ($\bar{X}$ = 3.09)
Teachers with high supervisor evaluation ratings ($\bar{X}$ = 2.54)	.03	-.55*
Teachers with moderate supervisor evaluation ratings ($\bar{X}$ = 2.51)		-.58*

*Significant

TABLE XVIII

TABLE OF DIFFERENCES FOR
TEACHERS DIFFERENTIATED ACCORDING TO SUPERVISOR EVALUATION SCORES--
TEACHER CONTACT TIME*

	Teachers with Moderate Supervisor Ratings	Teachers with Low Supervisor Ratings ($\bar{X}$ = -.93)
Teachers with high supervisor evaluation ratings ($\bar{X}$ = .42)	.33	1.35**
Teachers with moderate supervisor evaluation ratings ($\bar{X}$ = .09)		1.02**

*Items comprising this factor are: 1) the average number of minutes per hour teacher spent in contact with his students and 2) average number of minutes per hour adjusted for the number of students.
**Significant

TABLE XIX

TEACHERS DIFFERENTIATED ACCORDING TO SUPERVISOR EVALUATION SCORES--
SHOP COMMUNICATION INDICES

		Teachers with High Supervisor Ratings	Teachers with Moderate Supervisor Ratings	Teachers with Low Supervisor Ratings	F Ratio	p
		(Mean Values)				
Teacher-Initiated Contacts	Number of teacher-initiated contacts per hour	26.65	24.98	25.41	.30	NS
	Number of teacher-initiated contacts per student per hour	2.67	2.22	2.09	.96	NS
	Number of minutes per hour of teacher-initiated contacts with students	25.61	23.90	18.27	3.47	.05***
	Number of minutes per student per hour of teacher-initiated contacts with students	2.45	2.21	1.47	4.11	.025***
	Average length of time (minutes) of teacher-initiated contacts	1.59	1.18	.83	5.05	.01**
	Percentage of students contacted during shop session	94.4	97.4	97.9	3.17	.05**

TABLE XIX--Continued

		Teachers with High Supervisor Ratings	Teachers with Moderate Supervisor Ratings	Teachers with Low Supervisor Ratings	F Ratio	p
		(Mean Values)				
Student-Initiated Contacts	Number of student-initiated contacts per hour	13.28	12.52	13.80	.29	NS
	Average number of student-initiated contacts per hour	1.19	1.12	1.14	.10	NS
	Number of minutes per hour of student-initiated contacts with teacher	4.12	4.33	4.47	.07	NS
	Average number of minutes per hour that students spent in their initiated contacts with teacher	.40	.41	.50	.42	NS
	Average length of time (minutes) of student-initiated contacts	.39	.41	.40	.04	NS
	Number of teacher + student-initiated contacts per hour	40.13	38.08	40.00	.26	NS
	Number of teacher + student-initiated contacts per student per hour	3.36	3.28	3.18	.14	NS

TABLE XIX--Continued

		Teachers with High Supervisor Ratings	Teachers with Moderate Supervisor Ratings	Teachers with Low Supervisor Ratings	F Ratio	P
		(Mean Values)				
Combined Teacher & Student Contacts	Number of minutes per hour spent in teacher-initiated + student-initiated contacts	29.29	28.07	22.51	3.22	.05***
	Number of minutes per student per hour spent in teacher-initiated + student-initiated contacts	2.67	2.42	1.89	3.00	NS
	Average length of time (minutes) of teacher-initiated + student-initiated contacts	.99	1.61	.82	.71	NS
Positive and Negative Reinforcements	Number of instances of positive reinforcement per hour	2.07	2.02	1.39	.65	NS
	Number of instances of negative reinforcement per hour	1.48	1.34	1.50	.15	NS
	Total number of instances of reinforcement (positive and negative) per hour	3.50	3.36	3.08	.13	NS

TABLE XIX--Continued

		Teachers with High Supervisor Ratings	Teachers with Moderate Supervisor Ratings	Teachers with Low Supervisor Ratings	F Ratio	p
		(Mean Values)				
	Positive/Negative reinforcement ratio	2.22	2.50	1.60	.59	NS
Banter	Number of instances of banter per hour	2.78	2.58	1.74	1.14	NS
Interruptions	Number of interruptions per hour	2.02	2.07	2.06	.01	NS
	Number of minutes per hour spent in interruptions	5.96	7.18	8.64	.97	NS
	Average length of time of interruptions	2.60	2.93	4.82	2.37	NS

*The significant difference is between the means of the high and moderate evaluation groups.
**The significant difference is between the means of the high and low evaluation groups.
***The significant difference is between the means of the moderate and low evaluation groups.

the two items comprising the Teacher Contact Time index were both significant. In each case, teachers in the low evaluation group spent significantly less time in contact with students than did teachers in either the moderate or high evaluation groups. In addition, for teachers in the high evaluation group, the average length of time of the contacts was significantly greater than was the length of time of contacts for teachers in either the moderate or low evaluation groups. The average time of teacher-and student-initiated contacts also revealed significant differences, but these differences were mainly influenced by the measure of teacher contact time.

One item, percentage of different students contacted, produced some unexpected results. Teachers in the high evaluation group contacted significantly fewer students than did teachers in the moderate or low evaluation groups. However, unless a class size is greater than 28, the difference in the number of students contacted by the high evaluation group compared to the others was less than one (3.5% of 28). In other words, the difference, while significant, is probably not meaningful since no class had that many students.

Not all teachers conducted a formal classroom session separate from the shop session; however, for those teachers in each group who did, an assessment was made of their communication skills. Ten items comprised the classroom skills factor; however, some items were not always relevant to a given teaching situation. Therefore, a score was derived by summing the item scores and dividing by the number of items checked.

Table XX shows that teachers in the high evaluation group were judged as significantly more skillful in handling the classroom session than teachers in the low evaluation group ($F = 4.90$; $p < .025$). No significant differences existed between teachers in the moderate evaluation group and those in either the high or low evaluation group.

Responses to the Q-sort items were also analyzed to determine whether the three groups differed significantly in their attitude toward various aspects of teaching. To derive a raw score, we first selected those items from each of the five teacher attitude factors (Table XII) that had a high and distinct loading. For Factor 1--Satisfaction with school--we chose the first five items. For the remaining factors, we chose only the first two items since in each case only two items were clearly associated with a single factor. The teacher's ranking of the items of each factor were then summed and used as an index of his attitude. Since several items had negative loadings, we had to reverse their polarity. This was done by subtracting the item score from 25. Thus, a 1 became 24 and a 24 became 1, etc.

With the exception of the fourth factor (Regret at being a teacher), a lower score represents a more favorable attitude. Table XXI shows, however, that while the mean scores of teachers in the high evaluation group generally reflected a more favorable attitude than the mean scores of teachers in the low evaluation group, none of the differences were significant.

TABLE XX

TABLE OF DIFFERENCES FOR
TEACHERS DIFFERENTIATED ACCORDING TO SUPERVISOR EVALUATION SCORES--
CLASSROOM SKILLS*

	Teachers with Moderate Supervisor Ratings	Teachers with Low Supervisor Ratings ($n = 10$; $\bar{X} = 2.49$)
Teachers with high supervisor evaluation ratings ($n = 23$; $\bar{X} = 1.93$)	-.27	-.56**
Teachers with moderate supervisor evaluation ratings ($n = 23$; $\bar{X} = 2.20$)		-.29

*Items comprising this factor are: 1) organization of information; 2) use of examples and illustrations to clarify information; 3) skill at using visual aids; 4) ability to create pleasant social-emotional environment; 5) enthusiasm for matter being taught; 6) appearance of self-confidence; 7) discipline; 8) skill at generating discussion and questions; 9) skill at showing relevance; and 10) management of problem-solving session.
**Significant

TABLE XXI

TEACHERS DIFFERENTIATED ACCORDING TO SUPERVISOR EVALUATION SCORES--
RESPONSES TO Q-SORT STATEMENTS

	Teachers with High Supervisor Ratings	Teachers with Moderate Supervisor Ratings	Teachers with Low Supervisor Ratings	F	p
	(Mean Values)				
Factor 1. Satisfaction with School	53.1	51.9	55.6	.56	NS
Factor 2. Satisfaction with Teaching	9.0	10.7	9.6	.93	NS
Factor 3. Liking for Students	12.5	11.4	13.3	1.23	NS
Factor 4. Regret at being a Teacher	32.5	30.1	29.7	2.33	NS
Factor 5. Perception of Status	15.9	15.9	16.2	.05	NS

The preceding analyses reflect the differences in communication abilities among teachers who were grouped according to supervisors' perception of their abilities. Most of the differences existed between the high or moderate and low evaluation groups. Highly rated teachers and those with moderate evaluations were significantly more dynamic than those teachers who were rated low and the high evaluation group had significantly better delivery skills. The use of gesture and eye contact (bodily action) by the high and moderate groups was also judged as superior. In addition, the highly rated teachers and those with moderate ratings spent significantly more time in direct contact with their students than teachers who were rated low. The teachers with high evaluations also conducted their classroom sessions significantly more skillfully than teachers in the low group. Surprisingly, the high evaluation group contacted a significantly smaller percentage of students than did the moderate and low evaluation groups. An inspection of the means indicated, however, that the differences between the high evaluation group and the other two may not have been important.

Student Evaluation Scores. Following the analyses based upon supervisor evaluations, the teachers were regrouped according to their student evaluation scores. These data were derived by summing for each teacher the mean scores of the nine items on the student evaluation form.[8] (The mean score of an item was the sum of the student evaluation scores for that item divided by the number of students in the class.) The scores were then rank ordered and teachers were divided into three groups: 1) the upper quartile (n = 30); 2) the middle 50% (n = 63); and 3) the lower quartile (n = 30).

Table XXII shows the background of the three groups of teachers. As was the case for the supervisor evaluation groups, the same teachers grouped according to student ratings varied only slightly.[9] The teachers with high student evaluations were somewhat younger than teachers in the moderate and low evaluation groups and had less teaching and practical experience.

Drop rate was lowest for teachers in the high evaluation group, but absentee rate was lowest for teachers in the low evaluation group (Table XXIII). The age of the students in each group as well as the number of students in the class, the number of months they had been under the supervisor's instruction, and their achieved educational level were also quite similar.

While the background information about the teachers and the students was very similar, the analyses of variance of communication indices revealed many significant differences that existed among the three groups of teachers. Table XXIV shows that teachers in either the high evaluation or moderate evaluation group were judged significantly better on the Dynamism factor than were teachers in the low evaluation group ($F = 5.90$; $p < .005$). The difference between the mean scores of teachers in the high evaluation group and those in the moderate evaluation group was not significant.

TABLE XXII

BACKGROUND OF TEACHERS DIFFERENTIATED ACCORDING TO STUDENT EVALUATION SCORES*

	Teachers with High Student Ratings (n = 30)	Teachers with Moderate Student Ratings (n = 63)	Teachers with Low Student Ratings (n = 30)
	(Mean Values)		
Years of practical experience	19.0	21.5	21.0
Years of education beyond secondary level	2.0	1.8	2.1
Number of courses in vocational education	7.1	8.4	7.2
Number of courses in communication	.7	1.0	.8
Number of courses in psychology	1.0	1.2	1.5
Years of teaching experience	6.3	7.6	7.7
Years teaching current subject matter	5.2	6.6	6.8
Years at current school	3.8	4.5	4.5
Age	45.1	47.9	45.8

*The average student evaluation score for teachers in the high evaluation group was 49.47; for teachers in the moderate evaluation group, 46.11; and for teachers in the low evaluation group, 39.05. Each of the nine items was scored from 1 (low) to 6 (high).

TABLE XXIII

TEACHERS DIFFERENTIATED ACCORDING TO STUDENT EVALUATION SCORES--
INFORMATION ON PROGRAM AND STUDENTS

	Teachers with High Student Ratings (n = 30)	Teachers with Moderate Student Ratings (n = 63)	Teachers with Low Student Ratings (n = 30)
Percentage of students who dropped out of previous program*	10.4	15.2	11.6
Percentage of students absent	14.9	15.6	14.2
Average age of students	22.5	21.5	22.7
Average number of months under teacher's instruction	6.6	7.4	8.0
Average number of years of education	11.0	10.9	10.9
Average number of students in the class	12.4	12.5	13.1

*Students who left a program to take a skills-related job were not counted as having dropped out.

TABLE XXIV

TABLE OF DIFFERENCES FOR
TEACHERS DIFFERENTIATED ACCORDING TO STUDENT EVALUATION SCORES--
DYNAMISM*

	Teachers with Moderate Student Ratings	Teachers with Low Student Ratings ($\bar{X}$ = 12.77)
Teachers with high student evaluation ratings (X = 10.30)	-.37	-2.47**
Teachers with moderate student evaluation ratings (X = 10.67)		-2.10**

*Items comprising this factor are: 1) keeps everyone busy; 2) general vigor and enthusiasm; 3) skill at clarifying directions; 4) appearance of self-confidence; and 5) ability to create pleasant social-emotional environment.
**Significant

The Teacher Contact Time index also indicated significant differences among the three groups ($F = 3.85$ $p < .025$). The normalized data in Table XXV indicate that teachers in the high evaluation group and those in the low evaluation group spent significantly more time in direct contact with their students than did teachers in the moderate evaluation group. The difference between the average amount of contact time for teachers in the high evaluation group and those in the low evaluation group was negligible.

The analysis of variance for the Positive Reinforcement index (Table XXVI) showed that teachers in the high evaluation group scored significantly higher on this index than did teachers in either the moderate evaluation or the low evaluation group ($F = 4.09$; $p < .025$).

Since the data were normalized, the mean scores for each group reflect the magnitude of the deviation from the overall mean (0). While the average score for teachers in the high evaluation group was more than one standard deviation unit beyond the mean, the average scores for teachers in the moderate and low evaluation groups fell below the mean.

Table XXVII presents a breakdown of each communication item analyzed separately and explains, perhaps, the reason that the moderate group differed significantly from the low evaluation group in the amount of time spent in direct contact with their students. For instance, in Table XXV it was reported that teachers in the low evaluation group spent significantly more time in their initiated contacts with students than teachers in the moderate evaluation group. This finding is supported in Table XXVII which shows that "Number of minutes per student per hour of teacher-initiated contacts with students" was the most important item of the index contributing to that significance. However, when average time of student-initiated contacts was considered (i.e., the item "Average number of minutes per hour that students spent in their initiated contacts with teacher"), just the opposite significant difference was found. Students of teachers in the moderate evaluation group averaged significantly more time per student than students of teachers in the low evaluation group. Thus, the two significant differences counterbalanced one another. This effect is shown more clearly in Table XXVII, in the combined teacher and student contact time measures (Number of minutes per hour spent in teacher-initiated + student-initiated contacts and Number of minutes per student per hour spent in teacher-initiated + student-initiated contacts). An analysis of these items indicated that no significant differences existed among the three groups of teachers. In fact, while Table XXV revealed that teachers in the high evaluation group spent significantly more time in contact with their students than teachers in the moderate evaluation group, the combined teacher and student contact time items showed no significant differences.

The significance of the Positive Reinforcement index was influenced primarily by the measure of banter. Teachers in the high evaluation group engaged in banter significantly more often than did teachers in either the moderate or low evaluation groups. While the number of instances of

TABLE XXV

TABLE OF DIFFERENCES FOR
TEACHERS DIFFERENTIATED ACCORDING TO STUDENT EVALUATION SCORES--
TEACHER CONTACT TIME*

	Teachers with Moderate Student Ratings	Teachers with Low Student Ratings ($\bar{X}$ = .45)
Teachers with high student evaluation ratings ($\bar{X}$ = .49)	.89**	.04
Teachers with moderate student evaluation ratings ($\bar{X}$ = -.40)		.85**

*Items comprising this factor are: 1) the average number of minutes per hour teacher spent in contact with his students; and 2) average number of minutes per hour adjusted for the number of students.
**Significant

TABLE XXVI

TABLE OF DIFFERENCES FOR
TEACHERS DIFFERENTIATED ACCORDING TO STUDENT EVALUATION SCORES--
POSITIVE REINFORCEMENT

	Teachers with Moderate Student Ratings	Teachers with Low Student Ratings ($\bar{X}$ = -.63)
Teachers with high student evaluation ratings ($\bar{X}$ = 1.12)	1.32**	1.75**
Teachers with moderate student evaluation ratings ($\bar{X}$ = -.20)		.43

*Items comprising this factor are: 1) the number of instances of positive reinforcement per hour; 2) the positive/negative reinforcement ratio ; and 3) the number of instances of banter per hour.
**Significant

TABLE XXVII

TEACHERS DIFFERENTIATED ACCORDING TO STUDENT EVALUATION SCORES
SHOP COMMUNICATION INDICES

		Teachers with High Student Ratings	Teachers with Moderate Student Ratings	Teachers with Low Student Ratings	F Ratio	p
		(Mean Values)				
Teacher-Initiated Contacts	Number of teacher-initiated contacts per hour	26.32	25.39	25.72	.07	NS
	Number of teacher-initiated contacts per student per hour	2.79	2.23	2.21	.97	NS
	Number of minutes per hour of teacher-initiated contacts with students	26.86	21.28	24.80	2.85	NS
	Number of minutes per student per hour of teacher-initiated contacts with students	2.40	1.85	2.60	3.71	.05***
	Average length of time (minutes) of teacher-initiated contacts	1.43	1.21	1.25	.46	NS
	Percentage of students contacted during shop session	97.9	96.2	95.1	1.37	NS

TABLE XXVII--Continued

		Teachers with High Student Ratings	Teachers with Moderate Student Ratings	Teachers with Low Student Ratings	F Ratio	p
		(Mean Values)				
Student-Initiated Contacts	Number of student-initiated contacts per hour	12.92	13.97	11.75	1.50	NS
	Average number of student-initiated contacts per hour	1.03	1.24	1.07	1.00	NS
	Number of minutes per hour of student-initiated contacts with teacher	4.07	5.03	2.90	2.96	NS
	Average number of minutes per hour that students spent in their initiated contacts with teacher	.42	.51	.25	3.39	.05***
	Average length of time (minutes) of student-initiated contacts	.36	.43	.36	.51	NS
	Number of teacher + student-initiated contacts per hour	39.42	39.98	37.44	.29	NS

TABLE XXVII--Continued

		Teachers with High Student Ratings	Teachers with Moderate Student Ratings	Teachers with Low Student Ratings	F Ratio	p
		(Mean Values)				
Combined Teacher and Student Contacts	Number of teacher + student-initiated contacts per student per hour	3.26	3.41	3.07	.64	NS
	Number of minutes per hour spent in teacher-initiated + student-initiated contacts	30.40	26.11	27.51	1.59	NS
	Number of minutes per student per hour spent in teacher-initiated + student-initiated contacts	2.66	2.29	2.42	.86	NS
	Average length of time (minutes) of teacher-initiated + student-initiated contacts	.97	.89	2.17	1.83	NS
Positive and Negative Reinforcements	Number of instances of positive reinforcement per hour	2.82	1.70	1.50	2.72	NS
	Number of instances of negative reinforcement per hour	1.33	1.51	1.35	.21	NS

TABLE XXVII--Continued

		Teachers with High Student Ratings	Teachers with Moderate Student Ratings	Teachers with Low Student Ratings	F Ratio	p
		(Mean Values)				
	Total number of instances of reinforcement (positive and negative) per hour	4.16	3.20	2.91	1.33	NS
	Positive/Negative reinforcement ratio	3.31	2.01	1.60	2.32	NS
Banter	Number of instances of banter per hour	3.62	2.34	1.72	4.01	.025**
Interruptions	Number of interruptions per hour	1.75	2.13	2.19	.70	NS
Interruptions	Number of minutes per hour spent in interruptions	5.29	7.18	8.27	1.18	NS
Interruptions	Average length of time of interruptions	2.55	3.06	3.96	.89	NS

*The significant difference is between the means of the high and moderate evaluation groups.
**The significant difference is between the means of the high and low evaluation groups.
***The significant difference is between the means of the moderate and low evaluation groups.

positive reinforcement per hour and the positive/negative reinforcement ratio showed no significant differences, teachers in the high evaluation group scored approximately twice as high on these indices as did teachers in the low evaluation group. Scores of teachers in the moderate evaluation group fell between the other two.

An analysis of variance of the classroom data (Table XXVIII) showed that teachers in either the high evaluation group or those in the moderate evaluation group were judged as significantly more skillful in conducting a formal classroom session than teachers in the low evaluation group ($F = 10.61$; $p < .001$). No significant difference was found for either the noise level in the classroom or the amount of time the teacher kept an obstacle between himself and his students.

An analysis of variance of the data obtained from the Q-sort rankings showed that teachers in the high and moderate evaluation groups had significantly more favorable attitudes toward their students than did teachers in the low evaluation group (Table XXIX). Also, teachers in the moderate evaluation group were significantly more satisfied with the status of their work than were teachers in the low evaluation group. Although the mean differences for the other factors were not significant, all of them were in the expected direction. (For the fourth factor, higher scores represent a more favorable attitude.)

To summarize the results of the analyses made according to student evaluation scores, we found that information about the background of teachers in each group, their programs, and their students, was very similar. However, significant differences were found in various communication skills and in the attitudes of the teachers. Teachers who fell in the high and moderate evaluation groups were significantly more dynamic than teachers in the low evaluation group. Also, they were judged as having significantly better classroom communication skills than the low evaluation group and had significantly more favorable attitudes toward their students. In addition, while the high evaluation group scored significantly higher on the Positive Reinforcement index than either the moderate or low evaluation groups, the moderate evaluation group indicated a significantly more positive attitude toward their role as teachers than did the teachers of the low evaluation group.

Combined Supervisor and Student Ratings. While the analyses of teachers grouped according to supervisor ratings and then according to student ratings shed some light on the relationship between the two teaching effectiveness criteria and the behavior and attitude of Industrial Education teachers, they did not reveal how the two rating measures interacted. For example, teachers in the high supervisor evaluation group were not necessarily in the high student evaluation group, and vice-versa. In fact, some teachers were in the high evaluation group according to one rating but in the low evaluation group according to another. Such differences in evaluations may have also been reflected in differences in the teacher's behavior and attitude. Therefore, a combined grouping was performed to test how differences in evaluations might be explained by communication behavior and attitude.

TABLE XXVIII

TABLE OF DIFFERENCES FOR
TEACHERS DIFFERENTIATED ACCORDING TO STUDENT EVALUATION SCORES--
CLASSROOM SKILLS*

	Teachers with Moderate Student Ratings	Teachers with Low Student Ratings ($n = 14$; $\overline{X} = 2.60$)
Teachers with high student evaluation ratings ($n = 14$; $\overline{X} = 1.89$)	-.13	-.71**
Teachers with moderate student evaluation ratings ($n = 28$; $\overline{X} = 2.02$)		-.58**

*Items comprising this factor are: 1) organization of information; 2) use of examples and illustrations to clarify information; 3) skill at using visual aids; 4) ability to create pleasant social-emotional environment; 5) enthusiasm for matter being taught; 6) appearance of self-confidence; 7) discipline; 8) skill at generating discussion and questions; 9) skill at showing relevance; and 10) management of problem-solving session.
**Significant

TABLE XXIX

TEACHERS DIFFERENTIATED ACCORDING TO STUDENT EVALUATION SCORES--
RESPONSES TO Q-SORT STATEMENTS

	Teachers with High Student Ratings	Teachers with Moderate Student Ratings	Teachers with Low Student Ratings	F	P
	(Mean Values)				
Factor 1. Satisfaction with school	53.1	50.4	56.7	1.96	NS
Factor 2. Satisfaction with teaching	7.8	9.9	10.6	1.86	NS
Factor 3. Liking for students	10.6	11.8	14.5	4.33	.025** ***
Factor 4. Regret at being a teacher	31.5	30.8	31.0	.12	NS
Factor 5. Perception of status	16.3	15.0	18.1	5.40	.01***

**The significant difference is between the means of the high and low evaluation groups.
***The significant difference is between the means of the moderate and low evaluation groups.

With three groups formed from each evaluation criterion, the combined ratings made it possible for a teacher to be placed in one of nine groups, a high supervisor-high student rating group, a high supervisor-moderate student rating group, etc. Since cell sizes would be decreased considerably by the increased number of groups, the high supervisor and moderate student rating group was combined with the moderate supervisor and high student rating group. Likewise the moderate supervisor and low student rating group was combined with the low supervisor and moderate student rating group. This procedure eliminated two groups. The remaining seven groups were comprised of teachers with: 1) high supervisor and high student evaluations (n = 14); 2) high supervisor and moderate student evaluations or moderate supervisor and high student evaluations (n = 34); 3) high supervisor and low student evaluations (n = 10); 4) moderate supervisor and moderate student evaluations (n = 32); 5) low supervisor and high student evaluations (n = 5); 6) moderate supervisor and low student evaluations or low supervisor and moderate student evaluations (n = 20); and 7) low supervisor and low student evaluations (n = 8).

Table XXX shows a comparison of the background of the teachers in each group. Few teachers received high supervisor and low student ratings (n = 10) or low supervisor and high student ratings (n = 5), and while 30 teachers comprised the upper quartile of student ratings, less than half of them had a similarly high supervisor rating. There were only half as many teachers in the low supervisor-low student evaluation group as in the high one. The reason for this was that only 23 teachers comprised the low evaluation group according to supervisor ratings. Of those 23 teachers, only eight fell into the lower quartile of student evaluation scores.

Despite the large number of groups created by the various combinations of supervisor and student evaluation scores, the only apparent systematic difference was found between the teachers of the two extreme groups, i.e., those teachers who were rated high by supervisors and students and those who were rated low by them. The teachers in the high evaluation group were on the average approximately seven and a half years younger than teachers in the lower evaluation group. Probably as a consequence of that, teachers in the high evaluation group reported fewer years of practical and teaching experience than did teachers in the low evaluation group. Also, they had acquired less formal education than low evaluation teachers.

For the two groups (3 and 5) comprised of teachers with markedly variant ratings, the figures show that teachers with high supervisor and low student evaluation scores were younger than those with low supervisor and high student evaluation scores but had more years of practical experience. These findings coincide with the relationships between each evaluation criterion and age and practical experience. For instance, the correlation between supervisor ratings and the age of the teachers is negative, (-.11), whereas the correlation between supervisor ratings and practical experience is slightly positive (.06). Just the opposite

TABLE XXX

BACKGROUND OF TEACHERS DIFFERENTIATED ACCORDING TO COMBINED SUPERVISOR AND STUDENT EVALUATION SCORES

	(1) Hi Sup Hi St (n=14)	(2) Hi Sup/ Mod St Mod Sup/ Hi St (n=34)	(3) Hi Sup Low St (n=10)	(4) Mod Sup Mod St (n=32)	(5) Low Sup Hi St (n=5)	(6) Mod Sup/ Low St Low St/ Mod Sup (n=20)	(7) Low Sup Low St (n=8)
	(Mean Values)						
Years of practical experience	17.8	21.8	24.8	21.1	17.4	19.4	20.5
Years of education beyond the secondary level	2.5	1.5	1.8	1.8	1.8	2.2	3.0
Number of courses in vocational education	6.2	7.3	4.6	7.6	8.8	9.8	12.1
Number of courses in communication	.5	.9	.8	1.0	.8	.9	.8
Number of courses in psychology	1.4	1.1	1.1	1.1	.8	1.2	2.5
Years of teaching experience	5.7	7.6	6.7	6.4	5.8	7.7	12.8
Years teaching current subject matter	3.5	6.6	4.6	5.9	5.4	6.8	12.8
Years at current school	3.3	4.4	3.5	4.5	5.4	4.1	6.0
Age	43.0	47.0	45.1	48.4	51.8	43.9	50.6

relationship is found for the student evaluation scores. While the correlation is slightly positive for teacher age, (.04) it is slightly negative for practical experience (-.03).

Table XXXI indicates that the students of teachers who received high supervisor and high student ratings were somewhat older than the students of teachers in the other groups. However, little can be inferred from this finding since the next oldest group of students is found for teachers who received just the opposite rating. Moreover, the relationship between the average age of the students and the supervisor and student evaluation scores was negligible, .02 for the former rating and -.01 for the latter.

As might have been expected, analyses of variance of the shop communication indices followed a pattern similar in most respects to that of the supervisor and student evaluation groups analyzed separately. However, a clearer indication is given of the differences in the criteria used by supervisors and students in assessing a teacher's abilities.

Table XXXII shows that teachers with low supervisor and low student evaluation scores were judged as significantly less dynamic than teachers in all but the third and fifth groups ($F = 3.02$; $p < .005$). These latter groups were comprised of teachers whose supervisor and student ratings were opposite. Interestingly, their mean ratings were the lowest of all groups except the last one (the group with low supervisor and low student evaluation scores).

In addition to the significant differences between group seven and the other groups, a significant difference was also found between the first group and the third. Teachers who received high supervisor and high student ratings (group one) were judged as significantly more dynamic than teachers who received high ratings from their supervisor but low ratings from their students (group three).

Table XXXIII shows that teachers in the first two groups, i.e., those with superior or moderately favorable supervisor and student ratings, spent significantly less time behind an obstacle than did teachers in the fifth group ($F = 2.49$; $p < .05$). While the difference between means of the first or second group and that of the last group was quite large, it was not significant. Since the fifth group is comprised of teachers with low supervisor and high student evaluation scores, these findings indicate that supervisors were more aware of or gave greater weight to how a teacher used time and space. This notion is more clearly supported by the results of the analyses made according to the supervisor evaluation scores. As previously noted, significant differences were found for the Teacher Contact Time index. However, when student evaluation scores were used as the criterion for grouping teachers, no significant difference resulted on this measure.

TABLE XXXI

TEACHERS DIFFERENTIATED ACCORDING TO SUPERVISOR AND STUDENT EVALUATION SCORES--
INFORMATION ON PROGRAM AND STUDENTS

	(1) Hi Sup Hi St (n=14)	(2) Hi Sup/ Mod St Mod Sup/ Hi St (n=34)	(3) Hi Sup Low St (n=10)	(4) Mod Sup Mod St (n=32)	(5) Low Sup Hi St (n=5)	(6) Mod Sup/ Low St Low Sup/ Mod St (n=20)	(7) Low Sup Low St (n=8)
	(Mean Values)						
Percentage of students who dropped out of previous program*	8.4	16.3	13.5	16.1	12.8	8.5	7.9
Percentage of students absent	12.9	15.4	16.4	15.9	19.8	13.1	15.3
Average age of students	25.1	21.1	20.1	22.0	20.6	22.4	23.5
Average number of months under teacher's instruction	6.8	6.8	9.7	7.7	6.6	7.6	6.9
Average number of years of education	11.2	10.9	11.1	10.8	10.4	11.1	10.5
Average number of students in the class	12.6	12.7	12.0	12.2	11.6	13.3	14.3

*Students who left a program to take a skills-related job were not counted as having dropped out.

TABLE XXXII

TABLE OF DIFFERENCES FOR
TEACHERS DIFFERENTIATED ACCORDING TO SUPERVISOR AND STUDENT EVALUATIONS--
DYNAMISM*

	(2) Hi Sup/ Mod St Mod Sup/ Hi St	(3) Hi Sup Low St	(4) Mod Sup Mod St	(5) Low Sup Hi St	(6) Mod Sup/ Low St Low Sup/ Mod St	(7) Low Sup Low St ($\bar{X}$=14.88)
(1) Hi Sup/Hi St ($\bar{X}$ = 9.46)	-1.1	-3.39**	-1.09	-2.94	-1.82	-5.42**
(2) Hi Sup/Mod St Mod Sup/Hi St ($\bar{X}$ = 10.56)		-2.29	.01	-1.84	- .72	-4.32**
(3) Hi Sup/Low St ($\bar{X}$ = 12.85)			2.30	.45	1.57	-2.03
(4) Mod Sup/Mod St ($\bar{X}$ = 10.55)				-1.85	- .73	-4.33**
(5) Low Sup/Hi St ($\bar{X}$ = 12.40)					1.12	-2.48
(6) Mod Sup/Low St Low Sup/Mod St ($\bar{X}$ = 11.28)						-3.60**

*Items comprising this factor are: (1) keeps everyone busy; 2) general vigor and enthusiasm; 3) skill at clarifying directions; 4) appearance of self-confidence; and 5) ability to create pleasant social-emotional environment.
**Significant

TABLE XXXIII

TABLE OF DIFFERENCES FOR
TEACHERS DIFFERENTIATED ACCORDING TO SUPERVISOR AND STUDENT EVALUATIONS--
PERCENTAGE OF TIME TEACHER KEPT AN OBSTACLE BETWEEN HIMSELF AND HIS STUDENTS

	(2) Hi Sup/ Mod St Mod Sup/ Hi St	(3) Hi Sup Low St	(4) Mod Sup Mod St	(5) Low Sup Hi St	(6) Mod Sup/ Low St Low Sup/ Mod St	(7) Low Sup Low St ($\bar{X}$=17.61)
(1) Hi Sup/Hi St ($\bar{X}$ = 3.14)	-2.82	-4.21	-4.71	-20.86*	-5.61	-14.47
(2) Hi Sup/Mod St Mod Sup/Hi St ($\bar{X}$ = 5.96)		-1.39	-1.89	-18.04*	-2.79	-11.65
(3) Hi Sup/Low St ($\bar{X}$ = 7.35)			- .50	-16.65	-1.40	-10.26
(4) Mod Sup/Mod St ($\bar{X}$ = 7.85)				-16.15	- .90	- 9.76
(5) Low Sup/Hi St ($\bar{X}$ = 24.00)					15.25	6.39
(6) Mod Sup/Low St Low Sup/ Mod St ($\bar{X}$ = 8.75)						-8.86

*Significant

Another significant difference was found for the index of Positive Reinforcement ($F = 2.28$; $p < .05$). The normalized data in Table XXXIV show that significant differences existed between the first group and all the others except groups two and five. The lack of significance for the fifth group, however, is probably due to the small number of teachers (5) in that group since the mean rating (-.87) is lower than the mean rating of any of the other groups except group seven.

The analyses of variance of Delivery and Bodily Action, which showed significant differences among the three groups of teachers when supervisor evaluation scores were used as the independent criterion, were not significant for the combined evaluation criteria. In both cases, however, teachers in the third group (high supervisor and low student ratings) scored higher than teachers in the fifth group (low supervisor and high student ratings).

Table XXXV gives the mean differences for Banter, the only communication measure that showed significant differences when each communication item was analyzed separately. While the differences in mean values for the other communication indices were almost always in the expected direction, a comparison of the between and within variance terms for the combined and separate analyses indicated that for the combined analyses the between groups variance was reduced considerably while the within groups variance was slightly increased. This alteration in between variance resulted from the fact that increasing the number of groups also increased the number of degrees of freedom, the denominator used in determining the mean square between groups. Conversely, the reduction in cell sizes reduced the numerator used in calculating that term. As a consequence, the power of the test to detect a significant difference was lessened considerably.

The available classroom data were also analyzed (Table XXVI), and the results showed that teachers with high supervisor and high student evaluation scores were judged as significantly more skillful in handling their classroom session that teachers who had received low supervisor and low student evaluation scores ($F = 4.20$; $p < .005$). Teachers in the second group (high supervisor and moderate student evaluation scores or moderate supervisor and high student evaluation scores) were also judged as significantly more skillful in classroom management than teachers in the last group (low supervisor and low student evaluation scores). Although the mean values of the first and second groups were almost identical, the cell size of the second was such that significance was also obtained between the scores of teachers in that group and teachers in the fourth group (moderate supervisor and moderate student evaluation scores).

The remaining analyses based on the combined supervisor and student evaluation scores were made for each of the five teacher attitude dimensions. The results of these analyses, shown in Table XXXVII, indicate that highly rated teachers had significantly more favorable attitudes toward students than teachers with low ratings.

TABLE XXXIV

TABLE OF DIFFERENCES FOR
TEACHERS DIFFERENTIATED ACCORDING TO SUPERVISOR AND STUDENT EVALUATIONS--
POSITIVE REINFORCEMENT*

	(2) Hi Sup/ Mod St Mod Sup/ Hi St	(3) Hi Sup Low St	(4) Mod Sup Mod St	(5) Low Sup Hi Sup	(6) Mod Sup/ Low St Low Sup/ Mod St	(7) Low Sup Low St ($\bar{X}$=-.98)
(1) Hi Sup/Hi St ($\bar{X}$ = 2.01)	1.64	2.81**	2.30**	2.88	2.45**	2.99**
(2) Hi Sup/Mod St Mod Sup/Hi St ($\bar{X}$ = .37)		1.17	.66	1.24	.81	1.35
(3) Hi Sup/Low St ($\bar{X}$ = -.80)			-.51	.07	-.36	.18
(4) Mod Sup/Mod St. ($\bar{X}$ = -.29)				.58	.15	.69
(5) Low Sup/Hi St ($\bar{X}$ = -.87)					-.43	.11
(6) Mod Sup/Low St Low Sup/ Mod St ($\bar{X}$ = -.44)						.54

*Items comprising this factor are: 1) the number of instances of positive reinforcement per hour; 2) the positive/negative reinforcement ratio; and 3) the number of instances of banter per hour.
**Significant

TABLE XXXV

TABLE OF DIFFERENCES FOR
TEACHERS DIFFERENTIATED ACCORDING TO SUPERVISOR AND STUDENT EVALUATIONS--
BANTER

	(2) Hi Sup/ Mod St Mod Sup/ Hi St	(3) Hi Sup Low St	(4) Mod Sup Mod St	(5) Low Sup Hi St	(6) Mod Sup/ Low St Low Sup/ Mod St	(7) Low Sup Low St ($\bar{X}$=1.38)
(1) Hi Sup/Hi St ($\bar{X}$ = 4.86)	2.31	2.85*	2.47*	3.16	3.03*	3.48*
(2) Hi Sup/Mod St Mod Sup/Hi St ($\bar{X}$ = 2.55)		.54	.16	.85	.72	1.17
(3) Hi Sup/Low St ($\bar{X}$ = 2.01)		-	- .38	.31	.18	.63
(4) Mod Sup/Mod St ($\bar{X}$ = 2.39)				.69	.56	1.01
(5) Low Sup/Hi St ($\bar{X}$ - 1.70)					-.13	.32
(6) Mod Sup/Low St Low Sup/Mod St ($\bar{X}$ = 1.83)						.50

*Significant

TABLE XXXVI

TEACHERS DIFFERENTIATED ACCORDING TO SUPERVISOR AND STUDENT EVALUATION SCORES--CLASSROOM SKILLS*

	(2) Hi Sup/ Mod St Mod Sup/ Hi St	(3) Hi Sup Low St	(4) Mod Sup Mod St	(5) Low Sup Hi St	(6) Mod Sup/ Low St Low Sup/ Mod St	(7) Low Sup Low St ($n=5; \bar{X}=2.76$)
(1) Hi Sup/Hi St ($n = 7; \bar{X} = 1.81$)	-.01	-.64	-.45	-.19	-.52	-.95**
(2) Hi Sup/Mod St Mod Sup/Hi St ($n = 16; \bar{X} = 1.82$)		-.63	-.44**	-.18	-.51	-.94**
(3) Hi Sup/Low St ($n = 4; \bar{X} = 2.45$)			.19	.45	.12	-.31
(4) Mod Sup/Mod St ($n = 16; \bar{X} = 2.26$)				.26	-.07	-.50
(5) Low Sup/Hi St ($n = 2; \bar{X} = 2.00$)					-.33	-.76
(6) Mod Sup/Low St Low Sup/Mod St ($n = 6; \bar{X} = 2.33$)						-.43

*Items comprising this factor are: 1) organization of information; 2) use of examples and illustrations to clarify information; 3) skill at using visual aids; 4) ability to create pleasant social-emotional environment; 5) enthusiasm for matter being taught; 6) appearance of self-confidence; 7) discipline; 8) skill at generating discussion and questions; 9) skill at showing relevance; and 10) management of problem-solving session.

**Significant

TABLE XXXVII

TEACHERS DIFFERENTIATED ACCORDING TO SUPERVISOR AND STUDENT EVALUATION SCORES--
RESPONSES TO Q-SORT STATEMENTS

	(1) Hi Sup Hi St	(2) Hi Sup/ Mod St Mod Sup/ Hi St	(3) Hi Sup Low St	(4) Mod Sup Mod St	(5) Low Sup Hi St	(6) Mod Sup/ Low St Low Sup/ Mod St	(7) Low Sup Low St	F	p
Factor 1. Satisfaction with school	50.7	51.8	53.8	51.4	54.8	59.2	55.8	.87	NS
Factor 2. Satisfaction with teaching	9.0	8.8	10.3	9.6	7.2	12.6	9.5	.99	NS
Factor 3. Liking for students	10.0	12.6	13.5	11.5	12.0	11.4	17.8	2.26	.05*
Factor 4. Regret at being a teacher	31.9	32.3	33.3	29.8	29.6	29.9	30.3	.94	NS
Factor 5. Perception of status	15.3	16.0	18.2	15.6	15.6	16.0	18.3	.77	NS

*The significant difference is between group 1 and group 7.

Absentee Rate. Following the analyses of the combined supervisor and student evaluation scores, teachers were regrouped according to absentee rate. Those in the lower quartile (i.e., teachers with the lowest absentee rate) had an average absentee rate of less than one per cent. Teachers in the middle 50 per cent of the sample had an absentee rate of 12 per cent, while teachers in the upper quartile had an average of 37 per cent of their students absent.

No significant differences beyond what might have been expected by chance were found for any of the indices of communication. (As will be noted in the regression analyses, the only factors that varied significantly with absentee rate were the average age of the students and noise level, very likely an age-related factor.) Students of teachers in the low absentee rate group were, on the average, 25 years old, while students of teachers in the middle 50 per cent group averaged 21 years of age. The high absentee rate students averaged just over 18 years of age.

Drop Rate. Teachers grouped according to drop rate also failed to reflect any differences in communication skills. The lower quartile of teachers reported a zero drop rate whereas the middle 50 per cent and upper quartile of teachers had an average drop rate of 9 per cent and 36 per cent respectively.

While students of teachers in the three drop rate groups were approximately the same age, the teachers were not. Those in the high drop rate group were on the average five years older than teachers in the low drop rate group and seven years older than teachers in the middle group. (This finding coincides with the regression analysis, the results of which are reported in the next section. This analysis indicated that the best predictor of drop rate according to the factors from which a prediction had to be made was the teacher's age.)

To summarize, the results of the analyses made according to absentee rate and drop rate suggest that these factors are not explainable in terms of the communication abilities of the teachers. Instead, they appear to be a result of the age of students in the program and, perhaps, the age of the teacher.

Class Size. Besides the four teaching effectiveness criteria, another variable which we believed might be associated with different communication behaviors was the number of students in a class, since the indices which were adjusted for the number of students varied with class size. In order to test whether class size variations made a difference, we divided teachers into four groups, those having: 1) less than 10 students in their class (n = 32); 2) 11-14 students (n = 50); 3) 15-18 students (n = 33); and 4) 19 or more students (n = 8). An analysis of variance was then performed for each communication item that would most likely be related to class size.

As expected, most of the significant differences in behavior were found for those indices which were adjusted for the number of students in the class. Table XXXVIII shows that the time of teacher-initiated contacts per student was significantly greater for teachers with less than 10 students than for teachers in any of the other groups ($F = 9.04$; $p < .001$). Table XXXIX shows a somewhat different pattern for the average time of student-initiated contacts (i.e., the time per student per hour).

Whereas the average time was smallest for teachers in the largest class size group, the average time was greatest for teachers who had between 15 and 18 students. Differences in average time between this group and each of the other three were significant ($F = 3.10$; $p < .05$). In addition, the difference between the average time of the first two groups was also significant.

Table XL, which considers the combined time of teacher- and student-initiated contacts (adjusted for the number of students), reveals a pattern similar to that found in Table XXXVIII. The average contact time per student of teachers in the first group was significantly greater than the average time of teachers in any of the other groups ($F = 17.64$; $p < .001$).

Tables XLI and XLII show that despite the longer duration of contacts per student of teachers in the smaller class size groups, teachers and students in the larger classes made significantly more contacts per hour (Table XLI : $F = 3.15$; $p < .05$; Table XLII: $F = 5.81$; $p < .001$).

When the data for teacher- and student-initiated contacts were combined, as shown in Table XLIII, a similar pattern was found. Teachers and students in two of the three larger class size groups made significantly more contacts per hour than teachers with classes of less than ten students ($F = 5.35$; $p < .005$). While the difference between the smallest and largest class size groups was not significant (due to the small number of teachers having 19 or more students), it was in the expected direction.

Table XLIV shows a different pattern when the data are adjusted for the number of students in a class. Teachers and students of classes with less than 10 students made significantly more contacts per student than teachers and students in classes whose sizes were either between 11 and 14 students or 19 or more students.

The results of the analyses made according to class size showed that most of the significant differences occurred between the smallest class size group (10 students or less) and each of the others. In only two instances did significant differences exist between groups having a class size of more than 10 students (Table XXXIX). Also, only one significant difference between the first group and one of the others was opposite the expected direction. As shown in Table XXXIX, students of teachers having between 15 and 18 students averaged significantly more time per contact than students of teachers having less than 10 students.

TABLE XXXVIII

TABLE OF DIFFERENCES FOR
TEACHERS DIFFERENTIATED ACCORDING TO CLASS SIZE--
TIME OF TEACHER-INITIATED CONTACTS PER STUDENT

	Teachers with classes of 11-14 students	Teachers with classes of 15-18 students	Teachers with classes of 19 or more students ($\bar{X}$ = 1.21)
Teachers with classes of less than 10 students ($\bar{X}$ = 3.03)	1.46*	.88*	1.78*
Teachers with classes of between 11-14 students ($\bar{X}$ = 1.57)		-.58	.36
Teachers with classes of between 15-18 students ($\bar{X}$ = 2.15)			.94

*Significant

TABLE XXXIX

TABLE OF DIFFERENCES FOR
TEACHERS DIFFERENTIATED ACCORDING TO CLASS SIZE--
AVERAGE TIME OF STUDENT-INITIATED CONTACTS

	Teachers with classes of 11-14 students	Teachers with classes of 15-18 students	Teachers with classes of 19 or more students ($\bar{X}$ = .19)
Teachers with classes of less than 10 students ($\bar{X}$ = .58)	.30*	-.38*	.39
Teachers with classes of between 11-14 students ($\bar{X}$ = .28)		-.68*	.09
Teachers with classes of between 15-18 students ($\bar{X}$ = .96)			.77*

*Significant

TABLE XL

TABLE OF DIFFERENCES FOR
TEACHERS DIFFERENTIATED ACCORDING TO CLASS SIZE--
AVERAGE TIME OF TEACHER- AND STUDENT-INITIATED CONTACTS

	Teachers with classes of 11-14 students	Teachers with classes of 15-18 students	Teachers with classes of 19 or more students ($\bar{X}$ = 1.38)
Teachers with classes of less than 10 students ($\bar{X}$ = 3.51)	1.71*	1.23*	2.13*
Teachers with classes of between 11-14 students ($\bar{X}$ = 1.80)		-.48	.42
Teachers with classes of between 15-18 students ($\bar{X}$ = 2.28)			.90

*Significant

TABLE XLI

TABLE OF DIFFERENCES FOR
TEACHERS DIFFERENTIATED ACCORDING TO CLASS SIZE--
NUMBER OF TEACHER-INITIATED CONTACTS

	Teachers with classes of 11-14 students	Teachers with classes of 15-18 students	Teachers with classes of 19 or more students ($\bar{X}$ = 26.30)
Teachers with classes of less than 10 students ($\bar{X}$ = 21.16)	-7.89*	-5.14	-5.14
Teachers with classes of between 11-14 students ($\bar{X}$ = 29.05)		2.75	2.75
Teachers with classes of between 15-18 students ($\bar{X}$ = 26.30)			--

*Significant

TABLE XLII

TABLE OF DIFFERENCES FOR
TEACHERS DIFFERENTIATED ACCORDING TO CLASS SIZE--
NUMBER OF STUDENT-INITIATED CONTACTS

	Teachers with classes of 11-14 students	Teachers with classes of 15-18 students	Teachers with classes of 19 or more students ($\bar{X}$ = 15.53)
Teachers with classes of less than 10 students ($\bar{X}$ = 8.87)	-6.26*	-5.09*	-6.66
Teachers with classes of between 11-14 students ($\bar{X}$ = 15.13)		1.17	- .40
Teachers with classes of between 15-18 students ($\bar{X}$ = 13.96)			-1.57

*Significant

TABLE XLIII

TABLE OF DIFFERENCES FOR
TEACHERS DIFFERENTIATED ACCORDING TO CLASS SIZE--
NUMBER OF TEACHER- AND STUDENT-INITIATED CONTACTS

	Teachers with classes of 11-14 students	Teachers with classes of 15-18 students	Teachers with classes of 19 or more students ($\bar{X}$ = 43.29)
Teachers with classes of less than 10 students ($\bar{X}$ = 30.69)	-13.46*	-10.10*	-12.60
Teachers with classes of between 11-14 students ($\bar{X}$ = 44.15)		3.36	.86
Teachers with classes of between 15-18 students ($\bar{X}$ = 40.79)			- 2.50

*Significant

TABLE XLIV

TABLE OF DIFFERENCES FOR
TEACHERS DIFFERENTIATED ACCORDING TO CLASS SIZE--
AVERAGE NUMBER OF TEACHER- AND STUDENT-INITIATED CONTACTS

	Teachers with classes of 11-14 students	Teachers with classes of 15-18 students	Teachers with classes of 19 or more students ($\bar{X}$ = 2.19)
Teachers with classes of less than 10 students ($\bar{X}$ = 3.92)	1.14*	.52	1.73*
Teachers with classes of between 11-14 students ($\bar{X}$ = 2.78)		-.62	.59
Teachers with classes of between 15-18 students ($\bar{X}$ = 3.40)			1.21

*Significant

Racial Differences. To determine whether teachers and students interacted differently with members of a different race than with members of the same race, we selected for study those classes that had a student racial proportion of at least one to four. In other words, 25 to 50 per cent of the students would be of one race, and 50 to 75 per cent of the students would be of the other. The classes of only four of the nine black instructors met this criterion, while the classes of 26 white instructors had the necessary proportion.

For each black and white instructor, the shop communication indices were reconstructed. The data used in computing each index were based first on the teacher's interaction with white students and then on his interaction with black students. Thus, a teacher had two scores for each index.

Differences in communication behavior could result from differences in proportionality. For example, if three-fourth of the students in a class were white, it would not be surprising to find that a teacher initiated contacts with white students three times as often as with black students. However, the communication indices that were adjusted for the number of students in a class compensated for differences in proportionality. Therefore, we decided to use as dependent measures the four indices that would accurately reflect teacher and student interaction according to race. These indices were: 1) the number of teacher-initiated contacts per student per hour; 2) the number of minutes per student per hour of teacher-initiated contacts with students; 3) the average number of student-initiated contacts per hour--i.e., the number of contacts averaged according to the number of students; and 4) the average number of minutes per hour that students spent in their initiated contacts with the teacher.

For each index a 2 X 2 factorial design (Figure 2) was used to test racial differences in communication.

	White Students	Black Students
White Teachers (n = 26)		
Black Teachers (n = 4)		

Figure 2. -- Factorial Design for Testing Racial Differences in Communication

The results of the analyses showed, however, no significant interactions between the teacher's race and the race of the students. Main effects were also non-significant.

Since the small number of black instructors probably precluded a meaningful test for significant differences, a series of graphs were prepared to enable an additional inspection of possible interactions. Figures 3 through 6 depict the mean values for each index. White teachers interacted more frequently and for a longer duration with white students than they did with black students. Likewise, black teachers made more contacts with their black students than they did with the white ones; however, the black teachers spent approximately the same amount of time with students, regardless of race, though they spent somewhat less time with either group than white teachers did.

In contrast to the white teachers, white students contacted their black teachers more frequently than they did white teachers but spent the same amount of time with each. The black students, however, exhibited a pattern of behavior similar to the white teachers. They made more contacts with the black teachers than they did with white teachers and also spent more time in contact with the black teachers.

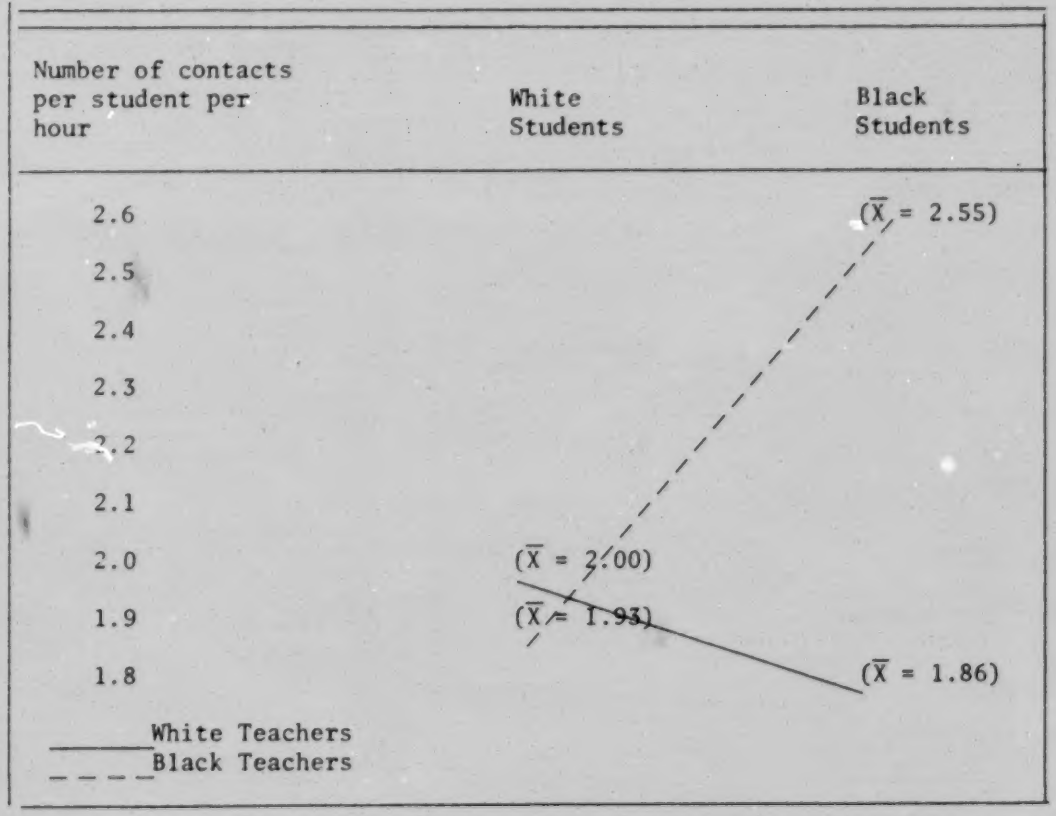

Figure 3. -- Teachers and Students Differentiated According to Race -- Number of Teacher-Initiated Contacts per Student per Hour

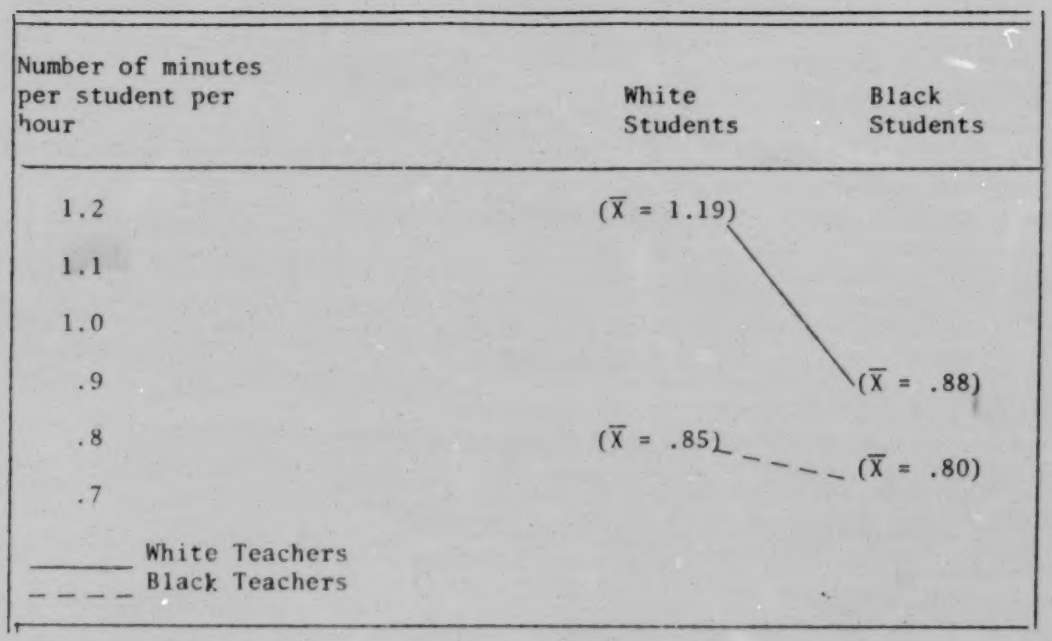

Figure 4. -- Teachers and Students Differentiated According to Race -- Number of Minutes per Student per Hour of Teacher-Initiated Contacts with Students

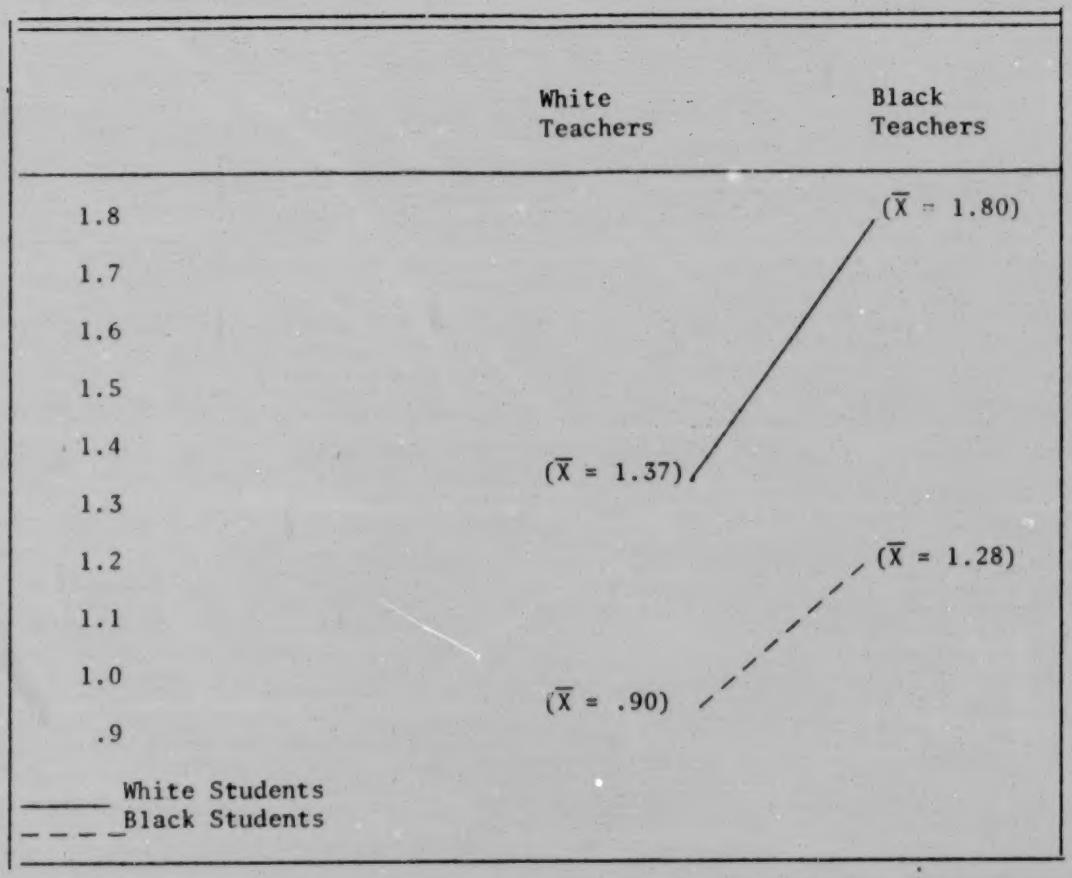

Figure 5. -- Teachers and Students Differentiated According to Race--Average Number of Student-Initiated Contacts per Hour

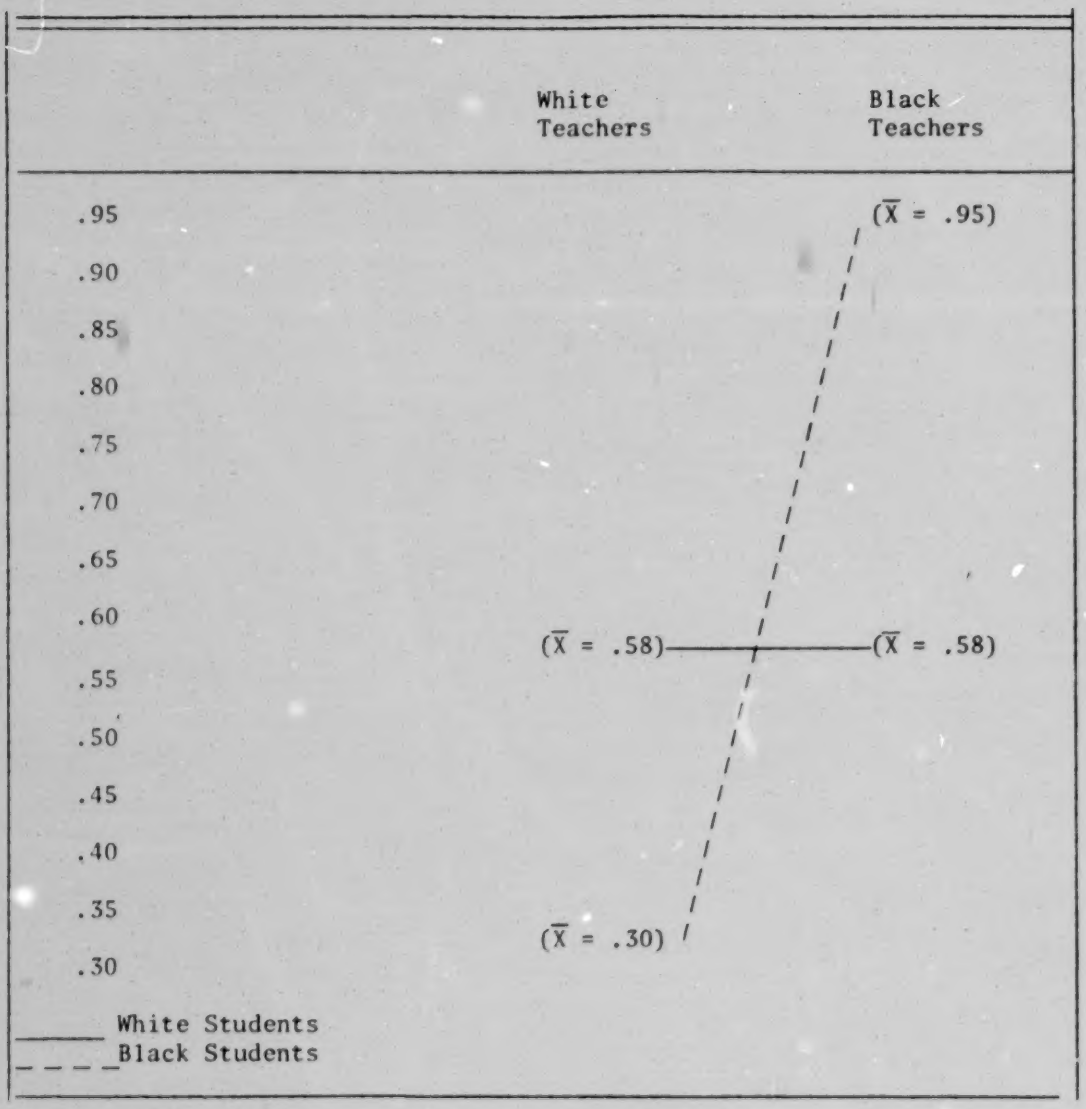

Figure 6. -- Teachers and Students Differentiated According to Race--Average number of minutes per hour that students spent in their initiated contacts with teacher

Correlational Analyses

Two sets of correlational analyses were carried out with the data collected in this study. In the first set of analyses, all independent variables were correlated with all four of the measures of teacher performance--supervisor evaluations, student ratings, drop rate, and absentee rate and then multiple correlations were computed in order to see what combination of independent variables would best predict the quality of teacher performance. Because we were primarily interested in getting ideas for ways in which teachers could improve the quality of their teaching, we did a second set of multiple correlations, this time using only the independent variables that a teacher might be able to do something about--i.e., variables that were aspects of a teacher's performance in the classroom. We omitted those variables over which a teacher had no control, e.g., his age or the number of years he had been a teacher, etc.

In planning and carrying out these analyses, we recognized that teaching is a complex activity and that even with all of the variables that were included in this study, there were still probably many other important and subtle variables that affect teaching performance that we did not consider. In addition, the heterogeneity of programs and levels of instruction that were included in this study increased with the within-groups variance, which has the effect of further reducing the correlations which we could obtain. Nonetheless, we believe that it is worthwhile to search for any means by which the quality of teaching can be improved, even if the probable improvement will be slight. Hence, we think that even small correlations, if statistically significant, which suggest some causal relationships between certain behaviors of teachers in the classroom and the effectiveness of these teachers, are important.

Two other caveats should be noted before the correlational analyses are presented. As with almost any analysis based on measures of association, there is a possibility that one is reversing the direction of a causal relationship in interpreting correlations--or that an obtained correlation is an artifact of each variable being caused by a third, common variable. However, until better evidence comes along, we believe that the best bet for the improvement of one's teaching is to work on the behaviors found here to be most closely associated with positive responses from students and supervisors.

The second caveat has to do with the multiple regression equations primarily, with the simple correlations to a lesser extent. As with any multiple dimension analysis, the likelihood of interaction among the variables increases as the number of variables increases. With as many variables as were used in the multiple regression analyses described below, it is virtually certain that there is a certain amount of interaction which is reducing the obtained measures of association and which complicates interpretation.

Predictors of Supervisor Evaluations. With 121 degrees of freedom, a product-moment correlation of approximately .23 is statistically significant at the .05 level of confidence. We found eight variables which were significantly correlated with supervisor evaluations.[10]

As the first three correlations in Table XLV indicate, the more courses in vocational education that a teacher has had or the more years that he has been teaching his present subject or the more overall years of teaching experience he has had, the greater the tendency for him to receive lower ratings from his supervisor. Though the next two correlations are negative, they actually indicate a positive relationship with ratings on Dynamism and ratings on Delivery because, on the scales that made up those factors, 1 was the most positive rating and 5 was the most negative. As noted earlier, Dynamism is the total for five ratings ("Keeps everyone busy," "General vigor and enthusiasm," "Skill at clarifying directions," "Appearance of self-confidence," and "Ability to create pleasant social-emotional climate") which were made for each teacher after observing him in the shop. The Delivery factor is made up of the total of four ratings ("Vocal loudness," "Vocal rate," "Fluency," and "Vocal variation").

When all of the independent variables were divided into two groups (the latter of which was comprised of the 24 shop communication items before they were combined into indices) and multiple regressions were done on each set, with supervisor evaluation as the dependent variable, multiple r's of .56 and .50 were obtained. For the first multiple r, it took twenty variables to get up to .56. However, a multiple r of .50 was achieved by the time the first six variables were entered into the equation. These six, their regression coefficients, and the intercept are shown in Table XLVI.

The direction of the relationship for each of these variables should be clear from the comments on the individual correlations, except for the regression coefficient for "Regret at being a teacher." The positive correlation indicates that the less a teacher regrets being in this profession the higher the supervisor rating tended to be. (On this teacher attitude factor, a high score indicated a favorable attitude.)

For the second set of variables, comprised of the shop communication items by themselves, a multiple correlation of .45 was obtained by the time eight variables were entered in the equation. These and the intercept are listed in Table XLVII.

When we recalculated the multiple regression using only those independent variables which we believe are under the control of a teacher most of the time, or on which he can improve with a reasonable amount of work, we obtained an r of .47 by the time we included nine variables. Additional variables made virtually no difference. Most of the variance could be accounted for by four variables, and a multiple correlation of .44 can be obtained using only those listed in Table XLVIII.

TABLE XLV

SIGNIFICANT CORRELATIONS BETWEEN
SUPERVISOR EVALUATION SCORES AND OTHER VARIABLES

Variable	r with Supervisor Evaluation
Courses in vocational education	-.31
Years teaching current subject	-.32
Years of teaching experience	-.23
Dynamism	-.24
Delivery	-.27
Teacher contact time	.24
Average length of time of teacher-initiated contacts	.26
Number of minutes per hour spent in teacher-initiated + student-initiated contacts	.25

TABLE XLVI

MULTIPLE REGRESSION EQUATION WITH SUPERVISOR EVALUATION SCORES AS THE DEPENDENT VARIABLE-- ALL INDEPENDENT MEASURES

Variable	Regression Coefficient
Years teaching current subject	-0.03169
Delivery	-0.03548
Teacher contact time	0.03930
Teacher attitude: Regret at being a teacher	0.00897
Courses in vocational education	-0.01910
Years of teaching experience	0.02307
Intercept	2.80070

TABLE XLVII

MULTIPLE REGRESSION EQUATION WITH SUPERVISOR EVALUATION SCORES AS THE DEPENDENT MEASURE--
SHOP COMMUNICATION ITEMS

Variable	Regression Coefficient
Average length of time of teacher-initiated contacts	0.07483
Percentage of students contacted during shop session	-0.01528
Number of instances of banter per hour	0.02167
Number of minutes per student per hour of teacher-initiated contacts with students	0.13126
Number of minutes per hour spent in teacher-initiated + student-initiated contacts	-0.03239
Average number of student-initiated contacts per hour	0.01406
Number of teacher and student-initiated contacts per student per hour	-0.06633
Number of instances of positive reinforcement per hour	0.02743
Intercept	3.61127

TABLE XLVIII

MULTIPLE REGRESSION EQUATION WITH SUPERVISOR EVALUATION SCORES AS THE DEPENDENT MEASURE--
VARIABLES UNDER TEACHER'S CONTROL

Variable	Regression Coefficient
Delivery	-0.01729
Teacher contact time	0.06455
Percentage of students contacted during shop session	-0.01797
Dynamism	-0.02913
Intercept	4.77403

Predictors of Student Ratings. Only three individual variables were significantly correlated with the student rating of teacher score. (Recall that the mean rating of the teacher from the entire class was used as the rating measure.) These three are presented in Table XLIX.

The correlations indicate that the more dynamic a teacher is, or the more his expressed attitude indicates a liking for students, or the more he creates a positive social-emotional climate in the shop through bantering with students and giving more positive reinforcement, especially in relation to the amount of negative reinforcement, the more highly students will rate him as a teacher.

As with the measure of supervisor evaluation, regression analyses were carried out to explore the combinations of independent variables which best predicted the student ratings. Initially, again, the analyses were done with each of two sets of independent variables so that all could be explored. With the first set of independent variables, a multiple r of .61 was achieved by the time we included eighteen independent variables, but the correlation was .51 with only six independent variables. Table L shows the six and the regression coefficients. With the next group of independent variables, the shop communication items, a multiple correlation of .46 was obtained. It did not increase after the seventeenth variable was added. A correlation of .37 was obtained, though, with only six independent variables (Table LI).

As with the supervisor ratings, we recomputed the regression equation using only independent variables which we believe are controllable by the individual teacher, this time with student rating as the dependent variable. Our maximum multiple r of .55 was obtained with twelve independent variables, but the first six alone brought the r up to .51. These are shown in Table LII.

The only surprises in this regression equation are the direction of association indicated by the regression coefficients for Bodily action and Appropriateness of language. According to these results, there is a tendency for teachers whom our observers rated as demonstrating better "bodily action" and more "appropriate language" to be rated lower as teachers by the students. "Model" gesture and language is, apparently, not reacted to as well by these students as we would have predicted. On the other hand, these students respond positively to a dynamic teacher, just as the supervisors do. (An interesting sidelight here is that Dynamism is positively correlated with both Bodily action and Appropriateness of language at a reasonably high level, .59 and .36 respectively, but only Dynamism shows much relationship to student ratings when pairs of variables are correlated; and it is the only one of the three with a negative regression coefficient in the multiple regression equations using student rating as the dependent variable.) These students also respond positively to a positive social-emotional climate (described earlier in this section) and to the behaviors manifested by teachers with relatively positive attitudes toward them (the students) and toward the school.

TABLE XLIX

SIGNIFICANT CORRELATIONS BETWEEN STUDENT EVALUATION SCORES AND OTHER VARIABLES

Variable	r with Student Evaluation
Dynamism	-.35
Teacher attitude: Liking for students	-.26
Positive reinforcement index	.24

TABLE L

MULTIPLE REGRESSION EQUATION USING STUDENT EVALUATION SCORES AS THE DEPENDENT MEASURE-- ALL INDEPENDENT MEASURES

Variable	Regression Coefficient
Dynamism	-0.62625
Bodily action	1.51998
Teacher attitude: Liking for students	-0.15594
Appropriateness of language	1.27484
Teacher attitude: Satisfaction with the school	-0.04523
Positive reinforcement index	0.20128
Intercept	49.53261

TABLE LI

MULTIPLE REGRESSION EQUATION WITH STUDENT EVALUATION SCORES AS THE DEPENDENT MEASURE--
SHOP COMMUNICATION ITEMS

Variable	Regression Coefficient
Number of instances of banter per hour	0.21178
Average number of minutes per hour that students spent in their initiated contacts with teacher	1.06706
Positive/Negative reinforcement ratio	0.20080
Average length of time of teacher-initiated contacts	0.96017
Percentage of students contacted during shop session	0.11091
Number of student-initiated contacts per hour	0.10670
Intercept	30.40120

TABLE LII

MULTIPLE REGRESSION EQUATION WITH STUDENT EVALUATION SCORES
AS THE DEPENDENT MEASURE--
VARIABLES UNDER TEACHER'S CONTROL

Variable	Regression Coefficient
Dynamism	-0.62625
Bodily action	1.51998
Teacher attitude: Liking for students	-0.15594
Appropriateness of language	1.27484
Teacher attitude: Satisfaction with the school	-0.04523
Positive reinforcement index	0.20128
Intercept	49.43261

Predictors of Drop Rate. Six significant correlations were found between drop rate and our independent variables (Table LIII).

Interestingly, as these correlations show, the teacher whose class is interrupted more often or for a greater proportion of his class period because of outside visitors, telephone calls, etc., tends to have a higher student drop rate. In addition, the teacher who gives more negative reinforcement and regrets being a teacher has a higher drop rate. Less understandable is the positive correlation of drop rate with the teacher's age and with the index of contact time between the teacher and individual students.

The regression analyses are even less helpful in explaining drop rate, even though with the first set of independent variables we were able to obtain a correlation of .63 with 23 variables, .55 with seven. The seven are presented in Table LIV. With the next group of independent variables, the multiple correlation reached .51 with sixteen variables, but .44 with three. These three are shown in Table LV.

Additional regression analyses attempting to explain drop rate did not appear to us likely to be fruitful. On the basis of the analyses just reported, considering only those behaviors which a teacher might be able to change, it appears that the Industrial Education teacher might reduce drop rate somewhat by reducing the amount of class time wasted by outside interruptions and by reducing the use of negative reinforcement. These findings appear to have some face validity. On the other hand, the relationships of drop rate with the other variables ranking high in these regression results seem to us inexplicable at the moment. On the basis of the data that we have to date, we are not able to satisfactorily explain why there is a tendency for drop rate to increase with the teacher's better use of his voice and with the more status that he perceives he has as a teacher.

Predictors of Absenteeism. We were even less successful at shedding new light on the problem of absenteeism with our regression analyses. The reason is obvious when one considers the individual independent variables that correlated significantly with absenteeism. There were three of them (Table LVI).

As these data indicate, the major portion of the variance in absenteeism is due to the age and grade level of the students, rather than to any of the behaviors of the teachers which we examined. (Noise level is positively correlated with the age of the students in the class.) Therefore, additional regression analyses did not appear to us to be worthwhile.

Miscellaneous Correlations among Independent Variables. It may be interesting, if not useful, to examine the relationships among

TABLE LIII

SIGNIFICANT CORRELATIONS BETWEEN DROP RATE AND OTHER VARIABLES

Variables	r with Drop Rate
Number of minutes per hour spent in interruptions	.32
Age of teacher	.29
Number of instances of negative reinforcement per hour	.27
Number of interruptions per hour	.26
Average time of student-initiated contacts	.25
Teacher attitude: Regret at being a teacher	-.23

TABLE LIV

MULTIPLE REGRESSION EQUATION WITH DROP RATE AS THE DEPENDENT MEASURE--ALL INDEPENDENT MEASURES

Variables	Regression Coefficient
Age of teacher	0.37435
Delivery	-1.65280
Teacher attitude: Regret at being a teacher	-0.65668
Years of education beyond secondary level	-2.33098
Years teaching current subject	0.43453

TABLE LIV--Continued

Variable	Regression Coefficient
Average age of students in the class	-0.34002
Teacher attitude: Perception of status	-0.54613
Intercept	43.96429

TABLE LV

MULTIPLE REGRESSION EQUATION WITH DROP RATE AS THE DEPENDENT MEASURE--SHOP COMMUNICATION ITEMS

Variable	Regression Coefficient
Number of minutes per hour spent in interruptions	0.74154
Number of instances of negative reinforcement per hour	0.29370
Number of minutes per hour spent in teacher-initiated + student-initiated contacts	0.22632
Intercept	-2.44207

TABLE LVI

SIGNIFICANT CORRELATIONS BETWEEN ABSENTEEISM AND OTHER VARIABLES

Variable	r with Absenteeism
Average age of students in the class	-.35
Grade level of student	-.35
Noise level in the classroom (the lower the score, the greater the noise)	-.25

some of the independent measures also. Those which we believe should be of concern to teachers and administrators are listed in Table LVII.

One set of correlations which we found somewhat surprising are those involving amount of education and training. The training and education measures, which were correlated with each other, were not correlated significantly with much else besides age. For example, the only other variable we found correlated with professional experience was age ($r = .55$).

The positive relationship between positive and negative reinforcement we believe is especially worth noting here, as well as with the positive/negative reinforcement ratio and total amount of reinforcement. Negative reinforcement was correlated at a lower level with these latter two measures. These findings indicate that the teacher who gives more reinforcement overall, will tend also to make a greater proportion of that reinforcement positive. The less reinforcement he gives, the greater the probability that it will be negative when he does give it.

The fact that the class time eroded by interruptions is associated with length of time one has been at a school or with age is not surprising, nor especially distressing. What is distressing is the clear indication, though again not a surprising one, that what tends to get lost when there are many or prolonged interruptions is the interaction with individual students and the kind of teacher-student relationship which leads to banter.

Measures of Communication Skill. Because of our interests in communication and our belief that certain of the skills of communication are extremely important for the teacher, we examined the relationship among our four measures of these skills and between each of them and our other variables. As the matrix of correlations in Table LVIII shows, the various communication measures, with the exception of Appropriateness of language, were closely related, even though the Dynamism measure came from observation of the teacher's behavior in the shop and the other measures came from observation of his presentation in the classroom as well as in the shop. The lack of relationship between the use of language and the other communication skills is consistent with the findings in other communication studies.

More interesting are the relationships between each of these communication measures and other measures obtained in this study. These are shown in Table LIX. As these lists show, of the four communication measures, only Dynamism and Delivery were significantly correlated with a meaningful number of other variables. Bodily action was correlated with none. More important, as shown earlier in these results, only Dynamism and Delivery were significantly correlated with supervisor evaluation scores. Still more important, of all of the many variables included in this study, Dynamism was the only one found to correlate significantly with both Supervisor Evaluations and Student Evaluations.

TABLE LVII

CORRELATIONS AMONG VARIOUS ASPECTS OF
TEACHERS' AND STUDENTS' BACKGROUNDS AND BEHAVIOR

Variable	r
Years of Education Beyond Secondary Level	
Courses in vocational education	.48
Courses in communication	.44
Courses in psychology	.61
Years of teaching experience	.44
Years teaching current subject	.32
Courses in Vocational Education	
Supervisor evaluation scores	-.31
Years of education beyond secondary level	.48
Courses in psychology	.51
Teaching experience	.73
Years teaching current subject	.69
Years at this school	.41
Age of teacher	.38
Number of minutes per hour spent in interruptions	.25
Courses in Communication	
Years of education beyond secondary level	.44
Courses in psychology	.34

TABLE LVII--Continued

Variable	r
Courses in Communication	
Number of minutes per hour of student-initiated contacts with teacher	.29
Highest Grade Level Attained by Students of Teacher	
Absenteeism	-.35
Age	.68
Number of teacher-initiated contacts per hour	-.27
Average length of time of teacher-initiated contacts	.25
Number of student-initiated contacts per hour	-.25
Average length of time of student-initiated contacts	.27
Number of teacher and student-initiated contacts per hour	-.33
Number of teacher and student-initiated contacts per student per hour	-.26
Number of Instances of Positive Reinforcement per Hour	
Number of instances of banter per hour	.49
Number of instances of negative reinforcement per hour	.23
Positive/Negative reinforcement ratio	.77

TABLE LVII--Continued

Variable	r
Number of Instances of Positive Reinforcement per Hour	
Number of instances of positive and negative reinforcement per hour	.89
Dynamism And positive correlations with most of the measures of teacher and student interaction	-.34
Number of Minutes per Hour Spent in Interruptions	
Years at current school	.29
Age of teacher	.27
Courses in vocational education	.25
Positive reinforcement index	-.25
Banter	-.29
Percentage of time teacher kept an obstacle between himself and his students And negative correlations with most of the measures of contacts with students	.68

TABLE LVIII

CORRELATIONS AMONG FOUR MEASURES OF COMMUNICATION SKILLS

	Dynamism	Appropriateness of language	Delivery
Appropriateness of language	.36		
Delivery	.56	.21	
Bodily action	.59	.15	.67

TABLE LIX

CORRELATIONS OF DYNAMISM, DELIVERY, AND APPROPRIATENESS OF LANGUAGE WITH OTHER COMMUNICATION VARIABLES

Variable	r
Dynamism	
Supervisor evaluation score	-.24
Student evaluation score	-.35
Teacher attitude: Liking for students	.31
Number of instances of positive reinforcement per hour	-.34
Positive/Negative reinforcement ratio	-.23
Number of instances of positive and negative reinforcement per hour	-.32

TABLE LIX--Continued

Variable	r
Delivery	
Supervisor evaluation score	-.27
Noise level in the classroom	-.36
Number of instances of negative reinforcement per hour	-.26
Number of minutes per hour spent in student-initiated contacts with teacher	-.25
Number of minutes per hour spent in teacher-initiated and student-initiated contacts	-.25
Appropriateness of Language	
Teacher attitude: Liking for students	.24

The rest of the correlations shown indicate that the teacher rated as dynamic also tended to indicate a greater liking for students, gave more positive reinforcement to students, more negative reinforcement, and a higher ratio of positive to negative reinforcement.

The teacher rated as having better delivery tended to spend more time in individual contacts with students, tended to give more negative reinforcement, and tended to have a quieter classroom than did the teacher rated as having poor delivery.

FOOTNOTES

[1]The minimum eigen value was set at different levels to determine the factor structure that was most meaningful. For the factor analyses of communication measures reported in this section, the value used was 1.0.

[2]Only 57 teachers had a formal classroom session; therefore, the data from the classroom rating scales were subjected to a separate factor analysis. Omitting the items concerning voice quality, the remaining items loaded on a single factor. Thus, the index of "Skill in Conducting a Classroom Session" was comprised of all the items except those concerning voice quality. (The only other exception was the scale "use of visual aids/models" which was scaled from "often" to "never" and was analyzed separately from the interval scale data.)

[3]A factor analysis of the supervisor evaluation data revealed only one factor. Correlations among the five items comprising the instrument ranged from .32 to .59. Each coefficient was significant beyond the .01 level of confidence.

[4]Differences in student evaluation scores among the three groups were not significant, although the differences were in the expected direction.

[5]To preserve parsimony, we included in this section the results of only those kinds of analyses that were most useful to our understanding of the relationship between communication and teaching effectiveness. Other types of analyses, involving the kinds of behavior for which a teacher showed enthusiasm, the heterogenity of activities in the shop, etc., were undertaken, but they did not indicate an association between the particular variable (e.g., heterogenity of activities) and the teaching effectiveness criteria.

[6]The Fischer $\underline{t}$ was used for all post-hoc analyses. To minimize the probability of a Type 1 error, whenever more than three groups were analyzed, the accepted level of significance was raised to .01.

[7]Two other analyses of variance, one for the percentage of time a teacher kept an obstacle between himself and his students and the other for the average noise level in the classroom, were performed; but neither was significant.

[8]The student evaluation data were factor analyzed, and two factors, shown below, emerged.

Statement Concerns :	Factor 1	Factor 2
1. teacher's interest in his work	.77*	.26
2. teacher's awareness of safety procedures	.13	.86*
3. teacher's respect for students	.87*	.25
4. teacher's punctuality	.44	.44
5. teacher's dress	.38	.62*
6. teacher's genuine interest in students	.88*	.14
7. teacher's organization ability	.73*	.34
8. value of program to student	.23	.73*
9. relative effectiveness of teacher compared to other teachers	.73*	.54

*Loads heaviest on this factor.

Items comprising the first factor are directly related to teaching ability, while items from the second factor denote qualities of the teacher that are indirectly related to his teaching ability. One item, punctuality, loaded equally on both factors. Despite the emergence of two factors, the correlation between factors ($r = .92$) and the correlation matrix of the individual items suggested that a valid student evaluation score could be derived by combining all the item scores into a single index.

[9]The supervisor evaluation scores for these three groups of teachers were very similar; 2.59 for teachers in both the high and moderate evaluation groups, and 2.45 for teachers in the low evaluation group.

[10]The items that were not combined into indices, such as the ones found in Table IX, were included in the simple and multiple correlation analyses.

SUMMARY, CONCLUSIONS & RECOMMENDATIONS

Summary

The purpose of our study was to gain a better understanding of how communication relates to teaching effectiveness in the setting of vocational education. We defined teaching effectiveness in terms of four criteria: 1) supervisor evaluations of teachers, 2) student evaluations of teachers, 3) absentee rate, and 4) drop rate. The focus of our study was the vocational education teacher, whose behavior and attitude determine to a great extent the quality and quantity of learning that takes place in the classroom. Since few studies had analyzed communication in the vocational setting (especially the shop situation) and even fewer had attempted to relate classroom communication to teaching effectiveness, we proceeded in a manner which might be described as macroscopic.

Using direct observation as a means of collecting data, we developed a number of instruments to tap various aspects of verbal and nonverbal communication. One of the instruments took into consideration the frequency and duration of contacts between the teacher and his students, the amount and kind of praise and criticism that the teacher gave, the amount of time spent in interruptions, and the number of times the teacher engaged in banter with his students. Another instrument was designed to assess the teacher's organization and presentation skills, and the degree to which he displayed enthusiasm and self-confidence as he conducted his class. Additional measures of behavior, e.g., the manner in which students were addressed, the heterogenity of shop activities, etc., were included, along with a measure of the teacher's attitude toward various aspects of teaching, to give as complete a picture of the communication environment as was possible. Finally, these measures were supplemented by information about the teacher's background, his program, and students, and by a narrative account of the day's activities. The purpose of the narrative was to give a description of the overall style of the teacher and the perceived relationship between him and his students.

We selected as subjects for our study teachers from a number of Industrial Education programs whose shop and classroom activities were conducted in a relatively similar manner. The majority of the teachers taught in mechanics-type programs such as Auto Mechanics and Air Conditioning and Heating Mechanics. Most of the remaining teachers came from Machinist and Welding programs. The teachers were located in three types of schools: secondary schools, vocational-technical centers, and community colleges.

Two trained observers spent two days with each teacher recording his behavior and the behavior of his students. The primary measures used in our analyses were the averages of the two days' data. The observers collected data in 14 counties throughout the state. While most of the counties were located in the northern portion, we selected an equal number of teachers from the northern half of the state (using Orange County as the dividing line) and the southern half. It took approximately eight months to collect the data.

Once the data were collected, we did several factor analyses and, on the basis of the results, combined the data into various indices of communication and attitude. We then performed two kinds of analyses: 1) one-way analyses of variance in which we separated teachers into high, moderate, and low groups (using the scores on each teaching effectiveness criterion as the basis for grouping) and determined which communication skills and dimensions of teacher attitude discriminated among the three groups of teachers; and 2) multiple regression analyses which allowed us to select from the various measures of communication, attitude, and information about the teacher, his program, and his students, the best predictors of each teaching effectiveness criterion. In addition to these, we separated teachers according to the size of their classes and the race of the teachers and their students and analyzed the effects of each of these variables upon certain aspects of communication.

The results of our analyses underscored the importance of communication skills in the teaching/learning process. The most critical measures of communication, or at least the most critical of the ones we selected for study, had to do with how dynamic the teacher was (i.e., how well he could move about the shop in a manner that conveyed self-confidence, organizational ability, and enthusiasm); how well he could present his material (his delivery); how much time he spent with his students; and how often he praised their work and bantered with them.

Although we selected four criteria as indicators of teaching effectiveness, only two of them, supervisor and student ratings of teachers, were useful to our determining the relationship between teaching effectiveness and communication. The other two criteria, drop rate and absentee rate, were primarily related to the age of the teacher and the age of his students. They had little to do with his communication behavior.

In terms of communication and attitude, supervisors and students differed somewhat in their criteria for evaluating teachers. Whereas supervisors placed importance upon the teacher's delivery skills, his use of gesture and eye contact, and the time that he spent in direct contact with his students. the students were concerned with the teacher's attitude toward them and the kind of social-emotional environment he created in the shop. According to our analyses, teachers with high supervisor ratings (and sometimes even those with moderate ratings) had significantly better delivery skills than teachers with low supervisor ratings. Also, they displayed more eye contact and more skillful use of gestures and spent

significantly more time in direct contact with their students. The teachers who received high ratings from the students gave significantly more positive reinforcement and expressed significantly more favorable attitudes toward their students than teachers who received low student ratings.

The two aspects of communication which discriminated highly rated teachers from lowly rated ones for both supervisor and student evaluations were Dynamism in the shop and Classroom Skills (a measure of control and clarity). Since several of the items in these indices were similar (e.g., appearance of self-confidence and enthusiasm) we assume that they were measuring roughly the same skills in different contexts. Therefore, it is not surprising that if one of these indices discriminated between good and poor teachers, the other would also.

Besides analyzing the data according to supervisor evaluation and then student evaluation scores, we also used a combined supervisor and student rating as a means of grouping teachers and reanalyzed the data. As might have been expected, most of the significant differences in communication and attitude were found between the two extreme groups, i.e., those teachers who had received high supervisor and student ratings and those who had received low ratings from both supervisors and students.

The distinctions between these two groups of teachers were clear not only in our analyses of variance but also in the narrative descriptions of their shop and classroom sessions. Because the narratives paralleled so closely what we found in our statistical analyses, we will use them as a basis for summarizing the differences between the two groups. (Examples of the narrative accounts are found in Appendix M.)

As indicated earlier, each observer wrote a narrative description at the end of each day of what had gone on in the class that he had been observing. While he obviously was influenced by the data he had recorded, he did not know how the teacher of the class had been rated by his supervisor or students. Although student evaluations of teachers were filled out at the end of the second day and could have possibly affected the second day's description, the summaries show that the most detailed account of shop and classroom activities was given for the first day's session and that the second day's account simply noted whether any differences in overall behavior had occurred.

One of the most frequent comments in the narratives about the teachers with high ratings is that the teacher constantly moves about the shop, from one group to another. On the other hand, the comment on many of the narratives for the teachers with low ratings is that the teacher simply sits in his office for long stretches of time or in other ways ignores many of the students.

The relationship between the highly rated teachers and their students is continually described as warm and supportive, though not "buddy-buddy." These teachers tend to be addressed respectfully as Mr. ____ and, in turn, address students by their first names or nicknames.

On the other hand, there is a great deal of positive reinforcement and a certain amount of banter employed by almost all of these teachers. The narratives note that when they do give negative reinforcement, which is infrequently, it is consistently done gently; as one observer said of one of the highly rated teachers, "He is both niggardly and gentle with his criticism and quick and generous with praise." In the narratives about the teachers with low evaluations, on the other hand, the observers noted many instances of strong, unpleasant negative reinforcement. For example, one observer wrote about a student who was working on a project and who appeared nervous and lacking in self-confidence. The teacher of the class, instead of showing an awareness of the student's problem, yelled at him and chastized him for his poor work.

The observers noted that many of the teachers in the low evaluation group displayed little enthusiasm or concern for their work and tended to ignore students who were "goofing off" either inside the shop or outdoors. No instance of this was noted in the narratives about the highly rated teachers. On the contrary, it was repeatedly noted that they were serious about the work being done. They also tended to display confidence in the ability of their students to do anything. Quite a few of these highly rated teachers were reported to be using some form of the Socratic method in their teaching--asking questions or posing problems which students could figure out, rather than simply providing answers or telling students what to do. Sometimes when students had difficulty finding solutions, the observers noted that the teacher would give them clues, but no answer. The only negative observation about one of the teachers in the high evaluation group was that although he was quite good in the classroom, he was disorganized in the shop.

In reading both the positive and negative narratives, one can perceive an interesting and important phenomenon which is going on in those classes; the students--consciously or unconsciously--tend to model themselves after the teacher, whether that teacher is good or bad. For example, in the classes where the teacher is constantly moving and busy and interested in his work, the students tend to keep busy and interested; where the teacher appears to waste a great deal of time, many of the students tend to waste a great deal of time. In one class where the teacher often yells at the students, the students tend to yell all the time also. Of all the lessons to be gained from our study, this may be the most important of all: that one of the good ways for a teacher to get students to work and otherwise act in particular ways is to work and act in those ways himself.

After analyzing the data according to the combined supervisor and student ratings, we grouped teachers according to the size of their classes and found that most of the significant differences in frequency and duration of contacts (the only aspects of communication we investigated in relationship to class size) were between the smallest class size group (less than 10 students) and the others. While teachers with the fewest students spent more time in contact with each student, the teachers and students in the larger classes made significantly more contacts per hour. For class sizes of 11 - 14 students, 15 - 18 students, and 19 or more students, the

differences in frequency and duration of contacts, even when adjusted for the number of students in the class, were negligible.

No significant differences were found for frequency and duration of contacts when teachers and students were grouped according to race; however, only four black instructors had a sufficient proportion of black and white students in their classes to be included in the analyses. We noted, in a series of graphs, the tendency of black and white instructors and black students to interact most frequently with members of their own race. The white students, on the other hand, interacted somewhat more with black instructors than with the white ones.

The regression analyses gave us a slightly different way of looking at the relationship between communication and teaching effectiveness. In these analyses, we attempted to find the best predictors of each teaching effectiveness criterion, thereby enabling teachers to know what skills probably best lead toward improving the quality of their teaching. Interestingly, when we used the background information of teachers as well as the communication indices as independent variables, we found that the longer a teacher had been teaching, the less likely he was to have received a high rating from his supervisor. On the other hand, the better the teacher's delivery skills and the more time he spent in direct contact with his students, the more likely he was to have received a high supervisor rating.

The best predictor of student evaluations of teachers was Dynamism. The more dynamic the teacher, the higher the chances were that he received a high student rating. Although most of the relationships between communication skills and student evaluation scores were in the direction we expected (the more positive reinforcement that was shown the higher the student ratings of the teacher, etc.), two of them -- Bodily Action and Appropriateness of Language -- were not. For these two variables, the teachers with the more favorable scores received lower student ratings. Thus, what we perceived as "model" gestures and language were not perceived so by these students.

The predictors that we found for drop rate and absentee rate were much less understandable than the predictors of supervisor and student ratings of teachers. On the basis of the analyses we made, it appeared that teachers might reduce drop rate somewhat by decreasing the amount of time they spend in interruptions and by decreasing their use of negative reinforcement. We had no suggestions for reducing absenteeism since the variables that correlated significantly with it were not related to communication skills, but instead to the age and grade level of the students.

Conclusions

We may conclude from this study that there are identifiable differences in behavior among teachers who are categorized according to their supervisor and/or student ratings. While no doubt each teacher has a somewhat unique style or approach to teaching, the "best" teachers are characterized by

being very dynamic, by having superior delivery skills, by spending a great amount of time in direct contact with their students, and by creating a pleasant social-emotional environment through the use of positive reinforcement and banter. Each of these characteristics, as well as a positive attitude toward students, is an important determinant of favorable supervisor or student ratings. Only Dynamism, however, is an important determinant of both.

As we noted at the beginning of this report, few communication guidelines exist for aspiring or practicing vocational educators. Not only have previous studies of teacher-student interaction generally ignored the vocational setting, they have also failed to examine the relationship between communication and teaching effectiveness. Despite the limitations of our criteria for effective teaching, we have hopefully taken a step toward providing a useful understanding of communication in the teaching/learning process, especially as it occurs in the kinds of programs found in Industrial Education.

Recommendations

We noted at the beginning of this report the need for effective communication in the classroom and the dearth of knowledge about communication in the vocational education setting. The initial step toward understanding the role of communication involved determining those behaviors that relate to teaching effectiveness. Given the limitations of our efforts to make such determinations, including the assumption that our data are valid and reliable, we believe that the following recommendations are warranted.

1) The usefulness of our research depends ultimately upon the changes that a teacher makes in his behavior in order to become a better teacher. We therefore recommend that a population of Industrial Education teachers similar to the teachers who received low ratings (from supervisors or students) in our study be identified and invited to participate in an experimental teacher-training program in communication. A systematic study of changes in the teachers' behavior and consequent changes in their supervisor and student ratings would determine, in part, the validity of our findings and their usefulness as a guide in training teachers to become more effective communicators.

2) We believe that the findings of this report should be disseminated to all Industrial Education teachers. However, due to the technical nature of this monograph, we suggest that an additional report, written in layman's terminology, be prepared.

3) In order to maximize the utilization of our data, we believe that additional data should be collected from our sample of teachers and analyzed in relation to the data that already exist. For example, due to the numerous other instruments that had to be administered, we did not include a measure of self-concept. This personality variable, or its evaluative component, self-esteem, might prove to be an important determinant of communication. Indeed, previous studies have shown that perceived success in communication effects at least temporary changes in self-esteem.[1]

4) We recommend the development of additional "teaching effectiveness" criteria for the evaluation of vocational education programs. As mentioned earlier in the report, we would like to have had a measure of student achievement in the classroom or an employer's performance evaluation of a teacher's previous students as further indications of successful teaching. Such criteria might include not only skills-related measures but also measures of change in values, interests, and attitudes, the necessary concomitants of the acquisition of a skill. Improved criteria of teaching effectiveness, we believe, are important for the improvement of instruction.

5) Because of the uniqueness of the shop and classroom activities in the programs we studied, we cannot at this time generalize our findings beyond the area of Industrial Education. Therefore, we believe that a replication of our study should be made for the other areas of vocational education, e.g., Business Education, Home Economics, etc. Results from studies in these areas will facilitate a more unified approach to the development of pre-service and in-service teacher -training programs in communication of the sort that we suggest in our sixth recommendation.

6) So far as we know, there is no course in communication designed specifically for the vocational education teacher. We believe, however, that such a course could be constituted, at least for Industrial Education teachers, from the data we have collected. Once studies have been conducted in other areas of vocational education, similar courses could be developed. Ultimately, consideration should be given to incorporating such courses into the certification requirements of vocational educators.

7) We recognize that the value of a vocational program is related in many ways to factors beyond the teacher's control. Some of these factors involve communication. For instance, students communicate during the day not only with teachers but also with other students, counselors, and administrators. Their relationships to these groups may determine to some extent their attitudes toward the program and the degree to which they are motivated to acquire a skill. Thus, we recommend that studies be conducted at other levels of communication besides the classroom. Such studies may focus upon administrators and various aspects of organizational communication, or upon students and their interactions with counselors, administrators, and other students. In sum, we are suggesting that the most fruitful approach to understanding communication in vocational education is to consider the total communication environment.

FOOTNOTE

[1]See, for example, Churchill Roberts, "The Effects of Self-Confrontation, Role Playing, and Response Feedback on the Level of Self-Esteem," The Speech Teacher, XXI (January, 1972), 23-37.

APPENDIX A

LOCATION OF EACH PROGRAM

COUNTY	SECONDARY SCHOOLS	AREA SCHOOLS AND VOCATIONAL-TECHNICAL CENTERS	COMMUNITY COLLEGES
Alachua		Lincoln Center Voc-Tec Gainesville, Florida	
Brevard	Melbourne High School Melbourne, Florida		
	Eau Gallie High School Eau Gallie, Florida		
	Satellite High School Satellite Beach, Fla.		
	Satellite Beach High Satellite Beach, Fla.		
	Cocoa Beach High Cocoa Beach, Fla.		
	Rockledge High School Rockledge, Fla.		
	Titusville High School Titusville, Fla.		
Columbia			Lake City Community College Lake City, Fla.
Dade	Hialeah High Hialeah, Fla.		
	Miami Carol City Senior High Opa Locka, Fla.		
	Miami Central High Miami, Fla.		
	South Dade High Homestead, Fla.		
		Lindsey-Hopkins Voc-Tec Miami, Fla.	
		George T. Baker Aviation Miami, Fla.	
		Miami Central Adult Ed. Miami, Fla.	

COUNTY	SECONDARY SCHOOLS	AREA SCHOOLS AND VOCATIONAL-TECHNICAL CENTERS	COMMUNITY COLLEGES
Duval	Ribault Sr. High Jacksonville, Fla.		
	Raines High School Jacksonville, Fla.		
	Forrest High School Jacksonville, Fla.		
	Englewood High School Jacksonville, Fla.		
	Stanton High School Jacksonville, Fla.		
		Technical High #67 Jacksonville, Fla.	
			Florida Jr. College Jacksonville, Fla.
Escambia		George Stone Voc-Tec Pensacola, Fla.	
			Pensacola Jr. College Pensacola, Fla.
Hillsborough		Tampa Bay Voc-Tec Tampa, Fla.	
Jackson			Chipola Jr. College Marianna, Fla.
Marion	Forest High School Ocala, Fla.		
	Vanguard High School Ocala, Fla.		
			Central Florida Community College Ocala, Fla.
Okaloosa			Okaloosa-Walton Junior College Niceville, Fla.

COUNTY	SECONDARY SCHOOLS	AREA SCHOOLS AND VOCATIONAL-TECHNICAL CENTERS	COMMUNITY COLLEGES
Orange		Mid-Fla. Technical Orlando, Fla.	
Pinellas		Pinellas Voc-Tec Clearwater, Fla.	
		City Center for Learning St. Petersburg, Fla.	
Santa Rosa	Jay High School Jay, Fla.		
	Milton High School Milton, Fla.		
Taylor		Taylor County Voc-Tec Perry, Fla.	

APPENDIX B

LETTER OF INVITATION TO PARTICIPATE IN STUDY

BEST COPY AVAILABLE

O T. CHRISTIAN
MMISSIONER

STATE OF FLORIDA
DEPARTMENT OF EDUCATION

TALLAHASSEE 32304

August 15, 1972

Joe D. Wills
DIVISION OF VOCATIONAL, TECHNICAL AND ADULT EDUCATION

Dr. T. Felton Harrison, President
Pensacola Junior College
1000 College Boulevard
Pensacola, Florida 32504

Dear Dr. Harrison:

This letter is to invite the participation of your institution in a research project, "Communication Problems of Vocational Educators in the State of Florida," funded through a grant from this office, and directed by Dr. Churchill Roberts, Assistant Professor of Communication Arts at the University of West Florida, Pensacola.

Dr. Roberts is selecting and evaluating instruments which are designed to tap verbal and non-verbal communication skills through the systematic observation of teacher behaviors. He hopes to study approximately 120 teachers randomly selected from the following Industrial Education programs: Air Conditioning and Heating Mechanics, Automotive Body Repair and Refinishing, Automotive Mechanics, Aviation Mechanics, Machine Shop Work, Marine Engine Mechanics, and Welding.

Present plans call for an observer (data gatherer) to spend two days with each teacher who agrees to participate in the study. The data collecting phase will begin in October and take approximately seven (7) months. Results from this study will serve as a basis for developing pre-service and in-service teacher training programs devoted exclusively to problems of communication among vocational educators.

If you agree to participate in the study, please send a letter from your office to Dr. Roberts granting permission to contact the junior college dean of vocational-technical education inviting participation in the study. The letter should name a contact person in your institution to assist Dr. Roberts with his study. Following an explanation of the study, those administrators who agree to participate will submit an evaluation of teachers in selected programs.

From this list the final teacher sample will be drawn, and teachers will be contacted and invited to participate in the study. Data will be collected from teachers agreeing to participate.

Before data are collected, copies of all proposed instruments to be used will be submitted for your approval.

Your continued cooperation and leadership in the improvement of vocational education is appreciated.

Cordially yours,

Joe D. Mills

Joe D. Mills, Director
Vocational Technical and
Adult Education

JDM:VB:bh

APPENDIX C

NOTIFICATION OF ACCEPTANCE TO PARTICIPATE IN STUDY

MARION COUNTY SCHOOL BOARD

P. O. Box 670 -:- Phone 629-8041

512 S. E. 3rd Street

OCALA, FLORIDA 32670

Robert M. Dunwoody
Superintendent

Mr. Carl C. Freimuth
P. O. Box 253
Reddick, Florida 32686
Chairman

Mr. Leslie C. Turner
1138 S. E. 7th Street
Ocala, Florida 32670
Vice Chairman

Mr. Jerry Anderson
P. O. Box 87
Dunnellon, Florida 32630

Mr. Harold G. Floyd
233 N. W. 10th Street
Ocala, Florida 32670

Mr. Van E. Staton
5100 S. W. 7th Avenue
Ocala, Florida 32670

August 25, 1972

Dr. Churchill Roberts
Assistant Professor of Communication Arts
University of West Florida
Pensacola, Florida 32501

Dear Dr. Roberts:

We appreciate the invitation to participate in the research project, "Communication Problems of Vocational Educators in the State of Florida", and look forward to working with you in this effort.

In Marion County I would want the following two men to be fully advised concerning this project and to be our contact members for this research project. They are:

Mr. Marion Roche
Director, Vocational Education

Mr. Roland Best
Ass't. Director, Vocational Education

We have made considerable progress in Vocational Education in Marion County and realize that much more needs to be done. I am personally interested in your efforts to further improve the vocational education and if I can be of further assistance in your efforts please call me.

Sincerely,

Robert M. Dunwoody
District Superintendent

RMD/an

cc: Mr. Joe D. Mills, Director
Vocational-Technical and Adult Education
Department of Education

Mr. Marion Roche
Director, Vocational Education

Mr. Roland Best
Ass't. Director, Vocational Education

Mr. Dean Kells
Director, Curriculum Services

Mr. Donald J. Kearsley
Director of Federal Programs/Staff Coordinator

APPENDIX D

TEACHER ASSESSMENT INQUIRY FORM

TEACHER ASSESSMENT INQUIRY

Date of Rating _____
Supervisor _____

(A Confidential Report Obtained for Research Purposes)

Teacher _____ School or College _____ City _____

Directions: Using other vocational-technical teachers whom you have known as a reference group, give your assessment of the above-named teacher by responding to the four items listed below. Before marking your response to an item, read all of the responses listed along the three sectional continuum, and then mark the response that best characterizes the typical behavior of the teacher. If you do not have an adequate basis for making a response to one or more items, place a check mark in the rightmost column.

Your evaluation of this teacher will be for research purposes and will not be discussed with the teacher nor with anyone else. Your ratings will be used in a statistical analysis in which no specific reference is made either to you or to the teacher.

1. Which of the sets of relationships shown opposite this question best illustrates the teacher's interactions with students?	☐ Tends to be aloof with students, allows little or no time for interactions with individual students.	☐ Limits his contacts with students to the classroom, but assists individual students in the classroom who are self-motivated to seek his help.	☐ Seeks out students needing remedial or advanced instruction, is receptive to students who turn to him for advice and counsel.	☐ Inadequate basis for responding.
2. Select the pattern of behavior that is most characteristic of this teacher's relations with other teachers.	☐ Frequently consults with other teachers on instructional issues, as well as problems of individual students. Is receptive and outgoing toward his colleagues.	☐ Spends little or no time with his colleagues in the school. Is generally detached and uninvolved with his peers.	☐ Is responsive to overtures from his colleagues, but does not initiate such interaction. Assumes a neutral posture toward his colleagues--neither withdrawn nor involved.	☐ Inadequate basis for responding.
3. With reference to professional career development in vocational-technical education, which courses of action best reflect this teacher's future goals and aspirations?	☐ Voices some awareness of the need for professional development, but has not pursued any sustained action toward clearly defined goals.	☐ Steadily pursues a program of self-study. Guides himself by a set of long-range objectives. Discusses his plans with others to elicit their assessment and guidance.	☐ Shows no inclination to develop beyond his present level of professional training. Casts the image of being content not to improve professionally in vocational-technical teaching.	☐ Inadequate basis for responding
4. Indicate the present level of development of this person's competence as a teacher by choosing the response that most aptly describes him.	☐ Fails to relate techniques and practices being taught to clearly defined learning objectives.	☐ Is guided generally by learning objectives, but is not fully successful in relating his teaching to these objectives. Paces himself through his subject matter in a routine manner that suggests minimum competence.	☐ Links classroom activities to established learning objectives. Teaches in a manner to reflect solid preparation and competence in his area of speciality.	☐ Inadequate basis for responding
5. Overall, how does his success as a teacher compare with other vocational education teachers you have known?	☐ Among top 25% in effectiveness	☐ Among the middle 50% in effectiveness	☐ Among bottom 25% in effectiveness	

APPENDIX E

CODING FORM FOR TEACHER-STUDENT INTERACTION

Subject No. ____ Length of Shop Session _____	Small Group	(Individual students)																						
Positive Reinforcement																								
Negative Reinforcement																								
Teacher initiated contacts with students																								
Student initiated contacts with teachers																								
Banter																								
Interruptions																								

APPENDIX F

EXAMPLES OF POSITIVE AND NEGATIVE REINFORCEMENT

SUBJECT NO.	POSITIVE REINFORCEMENT	NEGATIVE REINFORCEMENT
075	Pat	No; No radio; Get busy; No; Stop
076	Good; Got it	
077	Right; Good; OK; Better; Pat; OK; Right; Good; Pat; Nod	Rough; Try again; Try again
078	Good; Pat; Smile	Wrong
079	Good	Too fast; Too high; Flat; Too close; Too big
080		No
081	Good	Wrong; No
082	Good; Very good; Right	Try again
083	Pat	
084	Very good; Good; Fine; Pat	No; Wrong; Late; Out!; Flat; Careful
085	Good; Smile; Nod	Wrong; No
086	Right; OK; Very good; Correct Right	Not right; Wired wrong; Still wired wrong; Not there; Don't touch that; Wrong; No; Observing is not enough, I want you to do a reading.
087	All right; Very good	Bad job; No; Bad; Way off; Wrong
088		You are all wrong.
089	All right; Pretty good; Very good; Looking better; Looks good; Beautiful; Good; Very good	No
090		Wrong; Wrong; You don't have good connections anywhere.
091	That's good; Looks all right; That right; Looks good; Good	Clean up; No; No; Didn't clean the drum; Lecture for skipping; Put that up; Not doing anything
092		Slow down.

SUBJECT NO.	POSITIVE REINFORCEMENT	NEGATIVE REINFORCEMENT
093	OK; Good; Smile; Nod; Pat	Wrong
094		Wrong; Too hot; No
095	Right; Good; Pat; Smile	Too fast; Too low; No: No sleep
096	Right; Good; Yes; Nod	Wrong
097	Better; Very good; Good; Right; Good; Very good	Get busy; Too cool; Wrong; Not quite; Keep busy; Too much
098	Right	
099	Right	Wrong
100	Good; Right; Nod	No; Try again; Wrong
101	Right; Nod	Wrong; Too hot; Slow down, Unsafe
102	Good; Very good; Right; Got it; Nod; Pat; Smile; Good; Yes; Very good; Real good; Right; Smile; Nod	No; Try again; Too small; Too fast; Slow down; Not quite; Not quite
103	Good; Smile; Right	Wrong tool; Shake
105	Good	
106		Wrong; No; Won't line up; Won't work
107	OK; Pretty Good; Nice; Real good; Good; Real Good; 100%; OK; You've got it; Good; OK; Good; Very good	Wrong vice; Too much pressure; Too big; Out too much; Crooked; Not quite; Too much pressure; Crooked; No; Need little more; Too tight; Don't press so hard; Too small; Split, no good; Really bad; Don't lubricate roller; Too much pressure; Too much pressure; Flat spot; No
108	Looks like a winner; OK; Good; Good job; Good show; That's right	Wrong; Book dirty; Way off; Wrong; Point
109		
109	Real good; Very good; Wonderful; Very good; Nicest one I've seen today; Wonderful; Very good; Looks good; Very nice; All right; Looks good; Very good; All right; Good; Very nice; Very nice; That's a boy; Very good; Nice; Looks	Not hot enough; Wrong; Never file backwards; Wrong

SUBJECT NO.	POSITIVE REINFORCEMENT	NEGATIVE REINFORCEMENT
	good; Beautiful; Very good; Beautiful	
110		Wrong; Start proper diagnosis; Wrong; Playing
111	Looks good; Good; Good work; Good	
112	Becoming an expert; You did it; Beautiful; Very good; Good mechanic; Good mechanic; Point	

APPENDIX G

SHOP RATING SCALES

SHOP RATING FORM

Code No. _____
Length of session (Min.)

_____
(less time for breaks and/or lunch)

		Exc.				Poor	
Keeps everyone busy		1	2	3	4	5	
General vigor and enthusiasm		1	2	3	4	5	
Skill at clarifying directions		1	2	3	4	5	
Appearance of self-confidence		1	2	3	4	5	
Ability to create proper social-emotional climate		1	2	3	4	5	
Use of visual aids/models	(often)	1	2	3	4	5	(never)
Skills at using visual aids/ models (if relevant)		1	2	3	4	5	

In general, how did instructor address students?

____ First names only

____ Last names only

____ Last names with courtesy title (Mr., Miss, Mrs.)

____ Other (explain)

SHOP RATING FORM
(continued)

Code No. _____

1. Estimate of time teacher stayed behind his desk or kept some other clear obstacle between himself and his students. _____

2. Kinds of activities for which teacher showed enthusiasm.

3. Kinds of activities for which teacher did not show enthusiasm.

4. Heterogenity of activities among students (check one)

All doing same thing	___
Most doing same thing	___
2 or 3 different kinds of activities	___
4 or 5 different kinds of activities	___
Almost all doing different things	___

5. Kinds of activities or student behaviors which generally got POSITIVE reinforcement.

6. Kinds of activities or student behaviors which generally got NEGATIVE reinforcement.

7. Noise level Noisy ___ ___ ___ ___ ___ Quiet

8. Type of shop session Length of time

Individual or group work projects	_____
Demonstration (for entire class)	_____
Other	_____

SHOP RATING FORM
(continued)

9. Think through the shop session you have just witnessed and note anything that struck you as particularly important regarding teacher-student interaction -- in other words, a kind of overall impression of the learning environment.

APPENDIX H

CLASSROOM RATING SCALES

(Check only those categories that are relevant)

Code No. _____
Length of session (Min.) _____
(less time for breaks and/or lunch)

Content of Material	Exc.				Poor	
Organization of information	1	2	3	4	5	
Use of examples and illustration to clarify information	1	2	3	4	5	
Use of visual aids/models (often)	1	2	3	4	5	(never)
List specific weaknesses/strengths						
Delivery of Material						
Vocal loudness	1	2	3	4	5	
Vocal rate	1	2	3	4	5	
Fluency	1	2	3	4	5	
Vocal variation	1	2	3	4	5	
Bodily action	1	2	3	4	5	
Note any distracting body or vocal manner						
Skill at using visual aids/models	1	2	3	4	5	
Other						
Ability to create pleasant social-emotional environment	1	2	3	4	5	
Enthusiasm for material being taught	1	2	3	4	5	
Appearance of self-confidence	1	2	3	4	5	
Maintaining discipline	1	2	3	4	5	
Appropriateness of language	1	2	3	4	5	
Skill at generating discussion and questions	1	2	3	4	5	
Skill at showing relevance of material to students	1	2	3	4	5	
Ability to maintain student interest	1	2	3	4	5	
Management of problem solving sessions	1	2	3	4	5	

CLASSROOM RATING FORM
(continued)

Code No. _____

1. Estimate of time teacher stayed behind his desk or kept some other clear obstacle between himself and his student. _____

2. Kinds of activities for which teacher showed enthusiasm.

3. Kinds of activities for which teacher did not show enthusiasm.

4. Kinds of activities or student behaviors which generally got POSITIVE reinforcement.

5. Kinds of activities or student behaviors which generally got NEGATIVE reinforcement.

6. Describe discursively the general relationship between teacher and students--formal vs. informal, friendly banter, etc.

7. Noise level

Noisy ___ ___ ___ ___ ___ Quiet

8. Type of classroom session — Length of time

General discussion _____

Problem solving _____

Lecture _____

Demonstration _____

Other _____

CLASSROOM RATING FORM
(continued)

9. Think through the classroom session you have just witnessed and note anything that struck you as particularly important regarding teacher-student interaction--in other words, a kind of overall impression of the learning environment.

APPENDIX I

TEACHER PROGRAM INFORMATION FORM

TEACHER-PROGRAM INFORMATION FORM

Code No. _____

1. Drop rate

   a. No. of students in previous program _____

   b. No. of students who dropped out (do not include those who left to take a skills-related job) _____

   c. Rate (%) _____

2. Absenteeism

   a. No. of students in program _____

   b. No. of students absent _____

   c. Rate (%) _____

3. Professional experience (practical experience) of teacher in months _____

4. Educational experience

   a. No. of years of education beyond secondary level _____

   b. Courses in vocational education _____

   c. Courses in Communication (speech or interpersonal communication) _____

   d. Courses in psychology _____

5. Teaching experience

   a. Total years _____

   b. Years teaching current subject matter _____

   c. Years at current school _____

6. Age of teacher _____

7. Ethnicity of teacher _____

APPENDIX J

Q-SORT STATEMENTS (TEACHER ATTITUDE)

Q-SORT STATEMENTS

1. The number of hours a teacher must work is unreasonable.
2. Our community makes its teachers feel as though they are not really a part of the community.
3. If I could earn as much money in another occupation, I would stop teaching.
4. The curriculum of our school is in need of major revision.
5. Teachers in this school are not as competent as those in some other schools with which I am familiar.
6. Students in this school generally tend to be misfits.
7. If I could plan my career again, I would not choose teaching.
8. This community expects its teachers to meet unreasonable personal standards.
9. I think I am underpaid for what I do in this school.
10. This school doesn't provide its teachers with adequate classroom supplies and equipment.
11. I do not want to be close personal friends with most of the teachers in this school.
12. In this school, I cannot insist on as high a standard in student performance as I would like.
13. Teaching gives me a great deal of personal satisfaction.
14. I feel that I am an important part of this school system.
15. Salary policies are administered in this school district with fairness and justice.
16. The head of our school does not understand or recognize good teaching.
17. The teachers in our school cooperate well with each other to achieve personal and school goals.
18. The primary function of this school is to keep these kids off the streets and out of trouble.
19. Teaching enables me to make my greatest contribution to society.

20. I feel reasonably successful in my present position.

21. Teaching affords me the security I want in an occupation.

22. Our school has a well-balanced curriculum.

23. The teachers in this school are among the hardest-working group of people I know.

24. I find my contacts with students, for the most part, highly satisfying and rewarding.

25. I would recommend teaching as an occupation to students of high scholastic ability.

26. The programs in our school make reasonable provision for individual differences among students.

27. Most of the students in this school are very likeable.

28. To me there is no more challenging work than teaching.

29. The procedures for teachers to obtain materials and services are well defined and efficient in this school.

APPENDIX K

STUDENT EVALUATION FORM

Code No. _____
(Not to be filled in by student)

Date _____

Age of Student _____

Number of months student has been under teacher's instruction _____

Highest grade student completed in school _____

Directions: On the form below indicate with an X the scale position which, in your judgment best describes your teacher. Mark on position only.

1. The teacher is highly interested in his work.

strongly agree	agree	agree slightly	slightly disagree	disagree	strongly disagree

2. The teacher's actions seem to indicate that he is not very concerned about safety in the shop.

strongly agree	agree	agree slightly	slightly disagree	disagree	strongly disagree

3. The teacher seems to have a deep respect for all students.

strongly agree	agree	agree slightly	slightly disagree	disagree	strongly disagree

4. The teacher never arrives on time and at the correct place.

strongly agree	agree	agree slightly	slightly disagree	disagree	strongly disagree

5. The teacher is always neat and dressed appropriately.

strongly agree	agree	agree slightly	slightly disagree	disagree	strongly disagree

6. The teacher has a genuine interest in me--beyond how well I perform in his class.

strongly agree	agree	agree slightly	slightly disagree	disagree	strongly disagree

7. The teacher's work is highly organized.

strongly agree	agree	agree slightly	slightly disagree	disagree	strongly disagree

8. This program so far has been of little value to me.

strongly agree	agree	agree slightly	slightly disagree	disagree	strongly disagree

9. The instructor is far better than most teachers I have had.

strongly agree	agree	agree slightly	slightly disagree	disagree	strongly disagree

APPENDIX L

Q-ANALYSIS OF TEACHER ATTITUDE RESPONSES

Q-ANALYSIS OF TEACHER ATTITUDE RESPONSES

Each teacher in the sample rank ordered 29 items which dealt with such topics as perceptions of their students, of fellow teachers, of the compensation and status of teachers, and of the school. These data were subjected to a Q-analysis, using a special program, QUANAL, developed by Norman Van Tubergen at the University of Iowa.* A figure of 2.2 was set as the minimum eigen value factoring criterion. Twenty-five per cent was set as the per cent that a factor had to be negative for the program to split it into two types, and we asked for a maximum of five factors. The correlation matrix was evaluated for principal component factors and then an oblique rotation was attempted. This rotation was unsuccessful because of excessive complex roots and so we used a varimax (orthogonal) rotation instead.

The most striking fact apparent in the results of the various analyses is the high level of agreement among teachers in the way in which they ordered the 29 attitude items. The correlation matrix among the 124 teachers was characterized by high positive coefficients. In one sense, the "best solution" may well be a single factor solution. With a five-factor solution, almost 75 per cent of the common variance is accounted for by the first factor in the principal components matrix. With the varimax rotation, 29 per cent of the common variance is accounted for by the first factor or type, 16 per cent by the second, 23 per cent by the third, 11 per cent by the fourth, and 22 per cent by the fifth. However, as the table below shows, there is a high correlation among the five types.

	1	2	3	4
2	.617			
3	.858	.704		
4	.566	.513	.531	
5	.747	.698	.787	.514

The most consistent attitudes among the teachers are those toward their students. The teacher tended to disagree strongly that "Students in this school generally tend to be misfits" and to agree strongly that "Most of the students in this school are very likeable" and "I find my contacts with students, for the most part, highly satisfying and rewarding." Highly consistent also was disagreement with the statement that "Our community makes its teachers feel as though they are not really a part of the community" and the agreement with the statement that "I feel reasonably successful in my present

*In library of University of Iowa Computer Center.

position." The average z-scores for these consensus items are shown at the end of this section. (Since greatest agreement was scored 1 and greatest disagreement was scored 24, a negative z-score indicates relative agreement and a positive z-score indicates relative disagreement.)

Though the agreement among these teachers in their ranking of attitude items was remarkably high, five "types" of teachers were detectable on the basis of their different orderings of the items. Three of the types were generally positive in their attitudes, while two were characterized by relatively negative attitudes. The items which distinguish each type are shown below.

Among the positive teachers, Types I and V are quite similar. Both are reasonably satisfied with their teaching careers, though for somewhat different reasons. Type I, whom we label the "High Social Identifier," likes and respects both his fellow teachers and the school. It is these factors, more than the act of teaching itself, which accounts for his satisfaction. Type V, on the other hand, is less satisfied with the school, though he respects his fellow teachers, and he finds teaching itself challenging and rewarding. We identify him as the "Dedicated Teacher."

The third type whom we found showed a high level of satisfaction we call the "Low Ego." His satisfaction seems to result from the fact that he sees teaching as a profession either consistent with or above his abilities and aspirations. Of the three positive types, he is the most satisfied. He is listed as Type III below.

Type II appears to be the opposite of Type III and so we call him the "High Ego." He does not believe that his value to the school or the amount and quality of work that he does is adequately recognized or rewarded; he does not have much respect for the school, and he would not recommend teaching as an occupation for bright students.

Type IV is the other negative type. We label him the "Isolate" because he neither likes nor respects his fellow teachers and he does not believe that he is an important part of the school system. He would prefer not to be a teacher.

To clarify the types, and further explicate the data, the information below is provided:

Type I: The "High Social Identifier." This type is distinguished by:

a. a very high level of satisfaction with the school and its procedures (especially as contrasted with Type V).
b. liking and respect for fellow teachers (which contrasts sharply with the attitudes of Type IV).

c. the desire to continue teaching.
d. the belief that the school has a well-balanced curriculum and that it provides adequately for differences among students.
e. the fact that in spite of all of those things, teaching itself does not give a great deal of satisfaction.

Type II: The "High Ego." This type teacher is characterized by:

a. his belief that he is an important part of the school system and that teaching gives him personal satisfaction.
b. dissatisfaction with the recognition or expectations of the school head and the community.
c. dissatisfaction with the school's procedures and curriculum.
d. the fact that he would not recommend teaching as a profession for bright students.

Type III: The "Low Ego." He is characterized by the following kinds of beliefs:

a. he finds teaching challenging and believes that he can make his greatest contribution to society through teaching.
b. he also likes the security that teaching gives him and does not complain about his salary.
c. unlike other teachers, he is not dissatisfied with the kinds of standards of student performance that he can insist on in this school.

Type IV: The "Isolate." This type of teacher is distinguished by:

a. his lack of respect and liking for other teachers.
b. his dissatisfaction with the salary that he receives and the number of hours he must work.
c. the fact that he does not consider himself an important part of the school system and does not think that he is making his greatest contribution to society through teaching.
d. the belief that he would not choose teaching if he were given the chance to plan his career again.

Type V: The "Dedicated Teacher." This last type is characterized in the following manner:

a. he is less satisfied than the other types with the standards that he can set for students in his school and with the materials which the school provides for teaching.
b. he believes that teaching is a good profession to recommend to bright students.

c. he is satisfied with the administrator of his school, his fellow teachers, and the community.
d. he would definitely choose teaching again if he were replanning his career.

Type I: "High Social Identifier"

Scored these items higher than other types did	Z-score	Differences from average Z
The procedures for teachers to obtain materials and services are well defined and efficient in this school.	-0.941	-1.047
Our school has a well-balanced curriculum.	-1.246	-1.035
The programs in our school make reasonable provision for individual differences among students.	-1.068	-0.757
The teachers in this school are among the hardest working group of people I know.	-0.713	-0.744
The teachers in our school cooperate well with each other to achieve personal and school goals.	-1.103	-0.669
Scored these items lower than other types did	**Z-score**	**Differences from average**
This school doesn't provide its teachers with adequate classroom supplies and equipment.	0.933	1.023
To me there is no more challenging work than teaching.	-0.644	0.866
I do not want to be close personal friends with most of the teachers in this school.	1.082	0.776
If I could earn as much money in another occupation, I would stop teaching.	1.399	0.529
Teaching gives me a great deal of personal satisfaction.	-1.302	0.479

Type II: "High Ego"

Scored these items higher than other types did	Z-score	Differences from average Z
The number of hours a teacher must work is unreasonable.	0.001	-1.210
The head of our school does not understand or recognize good teaching.	-0.143	-1.192
Teaching gives me a great deal of personal satisfaction.	-2.343	-0.823
This community expects its teachers to meet unreasonable personal standards.	0.222	-0.806
I feel that I am an important part of this school system.	-1.412	-0.581
The primary function of this school is to keep these kids off the streets and out of trouble.	0.987	-0.499

Scored these items lower than other types did	Z-score	Differences from average Z
The procedures for teachers to obtain materials and services are well defined and efficient in this school .	0.924	1.284
I would recommend teaching as an occupation to students of high scholastic ability.	1.224	1.235
Teaching affords me the security I want in an occupation .	1.035	1.161
The program in our school makes reasonable provision for individual differences among students .	0.385	1.058
Our school has a well-balanced curriculum .	0.245	0.828

Type III: "Low Ego"

Scored these items higher than other types did	Z-score	Differences from average Z
Teaching affords me the security I want in an occupation.	-0.931	-1.297
Teaching enables me to make my greatest contribution to society.	-1.794	-0.918
To me, there is no more challenging work than teaching.	-1.908	-0.714
Scored these items lower than other types did	**Z-score**	**Differences from average Z**
I think I am underpaid for what I do in this school.	1.010	1.058
In this school, I cannot insist on as high a standard in student performance as I would like.	0.761	0.952

Type IV: "Isolate"

Scored these items higher than other types did	Z-score	Differences from average Z
I think I am underpaid for what I do in this school.	-1.385	-1.936
If I could plan my career again, I would not choose teaching.	-0.357	-1.515
I do not want to be close personal friends with most of the teachers in this school.	-0.627	-1.360
If I could earn as much money in another occupation, I would stop teaching.	0.073	-1.128
Teachers in this school are not as competent as those in some other schools with which I am familiar.	0.023	-0.870

Scored these items lower than other types did	Z-score	Differences from average Z
The teachers in this school are among the hardest-working group of people I know.	0.843	1.201
The primary function of this school is to keep these kids off the street and out of trouble.	2.310	1.154
The teachers in our school cooperate well with each other to achieve personal and school goals.	0.276	1.056
The number of hours a teacher must work is unreasonable.	1.725	0.945
I feel that I am an important part of this school system.	-0.282	0.831
Teaching enables me to make my greatest contribution to society.	-0.529	0.663

Type V: Dedicated Teacher"

Scored these items higher than other types did	Z-score	Differences from average Z
In this school, I cannot insist on as high a standard in student performance as I would like.	-1.080	-1.349
This school doesn't provide its teachers with adequate classroom supplies and equipment.	-0.925	-1.299
I would recommend teaching as an occupation to students of high scholastic ability.	-0.605	-1.051

Scored these items lower than other types did	Z-score	Differences from average Z
The head of our school does not understand or recognize good teaching.	1.546	0.919
Teachers in this school are not as competent as those in some other schools with which I am familiar.	1.217	0.623
If I could plan my career again, I would not choose teaching.	1.332	0.596
This community expects its teachers to meet unreasonable personal standards.	1.230	0.454

Consensus items: (Range of 1,000 or less)	Average Z-score
I find my contacts with students, for the most part, highly satisfying and rewarding.	-1.44
I feel reasonably successful in my present position.	-1.14
Most of the students in this school are very likeable.	-1.00
Salary policies are administered in this school district with fairness and justice.	0.03
The curriculum of our school is in need of major revision.	0.51
Our community makes its teachers feel as though they are not really a part of the community.	1.01
Students in this school generally tend to be misfits.	1.06

APPENDIX M

POSITIVE AND NEGATIVE NARRATIVES

FIRST DAY

This instructor conducts a busy, cheerful class in a roomy, well-equipped shop. He makes extensive use of positive reinforcement, frequently employs friendly banter, and did not (at least during this first day of observation) employ any negative reinforcement of even the mildest variety.

The jobs undertaken by the students are not exercises but bona fide repair jobs of varying complexity and difficulty; there are, however, several exercise engines and one stripped-down truck available for exercise work. The instructor seldom takes an active part in the work, but is continuously moving about the shop supervising progress and proficiency. His supervisory efforts are carefully masked as rather casual remarks or questions in passing, and he never communicates a hint of the Big-Brother-is-watching image, yet nothing escapes him. He will frequently spend several minutes with a team or small group, but for the most part this time is spent in listening to the students describe their problems and making mild suggestions or asking pointed, leading questions until the students arrive at the answer/solution themselves.

SECOND DAY

The observations and impressions gathered during the first day's observed period were generally reinforced and strengthened during this second day. The instructor spent a great deal more time with the several teams or small groups engaged in several tasks, but he utilized the same technique as before, i.e., he took no active part in the work although he frequently handled tools and/or parts, and coached the students over problem areas with mild suggestions and/or pointed, leading questions so that the students arrived at the answer/solution themselves. As on the first day, he made frequent use of banter and positive reinforcement. However, as nearly as I could tell (not being a mechanic), there was no occasion for negative reinforcement.

FIRST DAY

The instructor spent the entire period touring, checking, and working with the students. There was a very friendly atmosphere and the students were as free to make contacts with the instructor as he was with them. He didn't stay with each person very long, but he made several contacts with each student (or most of them). Notice the amount of banter -- this didn't hurt the progress of work because the students worked the entire period.

The students were praised when they had done a good job on their projects. The instructor gave the reinforcement enthusiastically and repeated it several times. The two negative reinforcements on safety were (1) when student #2 was grinding a part down without safety glasses and the instructor stopped him and made him put the glasses on; and (2) when student #9 was hooking up a tank of nitrogen to his unit and he turned it on before he had it hooked up properly. It shot the plug off and started spraying. No one was hurt. The instructor's comment: "What did you do? -- Where is your head? You know you don't do that."

One rather neat sideline which I thought was interesting -- the instructor spins a wheel to determine who will assume the clean-up duties. The students accept their responsibilities. The relationship between students and teacher is open, friendly, and warm. The social-emotional atmosphere is great.

Good session!

SECOND DAY

Again, today the instructor was on the move constantly. He keeps moving from one group to another which I think keeps them fairly busy (except for a few who wander around a lot of the time).

One thing I especially noted about the instructor is his friendliness with the students and his interest in them. He doesn't give out positive reinforcement unless it is deserved and I think the students know they have done a good job when they do receive praise.

There is much activity in the class with everyone working and watching others work when they are free. There is much freedom in the shop and an informal atmosphere.

FIRST DAY

The instructor started the day by taking a half-hour break while several of the students went to work in the shop. I didn't count it as a legal break because so many of the students stayed in the shop. When he returned, he checked on what the students were doing and if they needed help, he would work with them.

For the amount of time spent in the shop, there were few contacts made. Notice that there is no praise but four instances of criticism. The instructor worked more with the groups than he did with individual students. The students came and went at will and at times there were few students in the shop. Notice the amount of time spent in interruptions. The instructor didn't seem to mind.

SECOND DAY

Today's session was like yesterday's in many ways. There were a number of interruptions and the instructor didn't seem to mind them; in fact, he verged on welcoming them. After the classroom session was over, the instructor took a half-hour break while some students stayed in the shop to work. After he got back, he checked around to see what the students were doing. Then he stood back and watched. Some of the students had to wait on parts and in the time they had to wait, he did nothing. Some of the students also disappeared for extended periods of time and the instructor didn't seem to mind. During the afternoon session, the instructor took a 35 minute break. Again, some of the students stayed in the shop unsupervised. The instructor worked with one group more than the others. Also, there were a couple of people who received little help at all.

FIRST DAY

The first ten minutes were used for administrative purposes. The instructor then had a film to show on fiberglass. Most students were attentive, but there was some talking. The class was dismissed to the shop right after the film. No explanation of the film's relevance was given. (The film was about fiberglass and the students couldn't completely understand the relevance.) The instructor had no real introduction either. He yelled at the students to settle down and get ready for the film. The class was unruly at first but settled down when the film started.

The classroom is again a very small section of the shop where the students put up folding desks to sit in. They bunch up into an even smaller area creating tight, close quarters which may be the reason why there is so much confusion. The instructor's overt behavior doesn't help though.

SECOND DAY

The class was a problem-solving session. The instructor passed out a work sheet on fractions. The class session was almost mass bedlam. The students talked more than they worked on the problems. They griped about the way the drawing had been done. The students didn't know how to do the problems and instead of the instructor helping them, he yelled at them for not working on the problem. I don't see how those who were working could concentrate because there was so much confusion in the room. There was a continuous verbal battle going on between the instructor and one of the students.

The session could have been handled in a more organized and comprehensive way. The instructor could have gained the interest of the students by working each problem with them and helping them as he went along. The session was, however, very disorganized.

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